

'Namgis Land-Based Atlantic Salmon Recirculating Aquaculture System Pilot Project

Aquaculture Innovation Workshop
September 26th, 2011



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Technical Advisory Committee





Project Partners

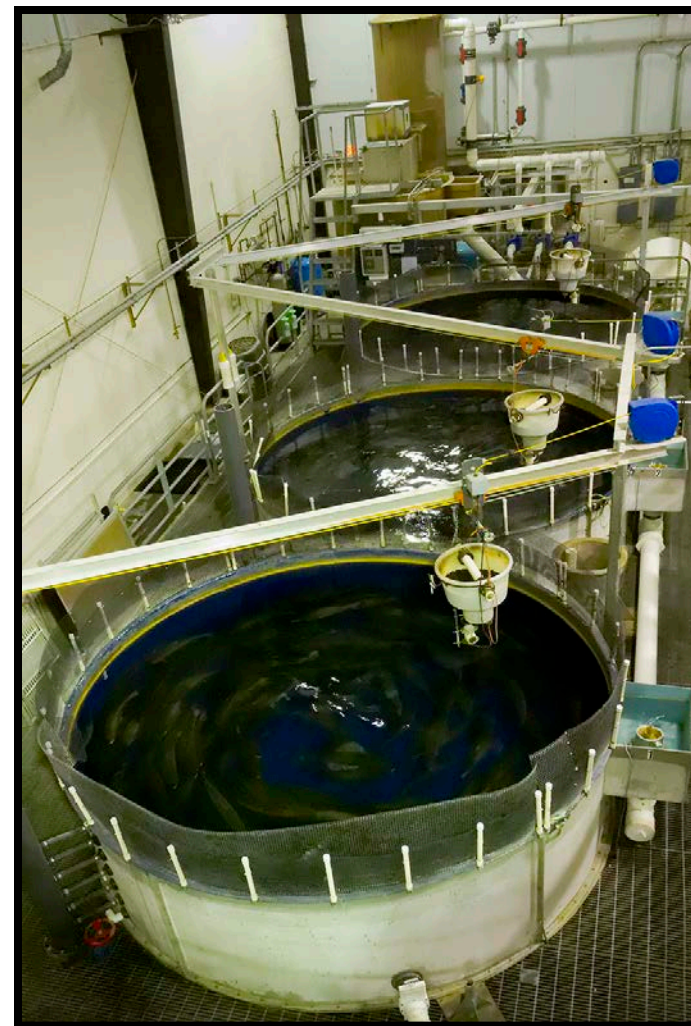


- 'Namgis First Nation
- The SOS Marine Conservation Foundation
 - With advisory support from:
 - Tides Canada
 - Conservation Fund's Freshwater Institute
 - Key suppliers:
 - PRAqua
 - Derk Construction

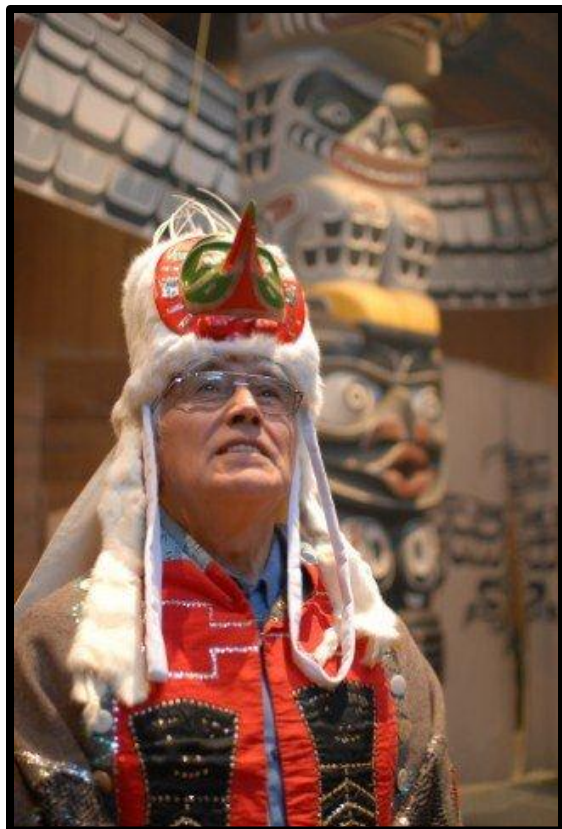


Project Summary

- 5 fish growout tanks
(+ quarantine tank and purge tank)
- Covered facility
- Groundwater disinfected on entry
- Slightly saline water at 15°C
- Fluidized sand bed biofilters
- 3 cohorts of Atlantic salmon
smolts/year to 260 tonnes/year
- 50 kg/m³
- Harvest sizes of 3 to 6 kg
- Continuous supply to market



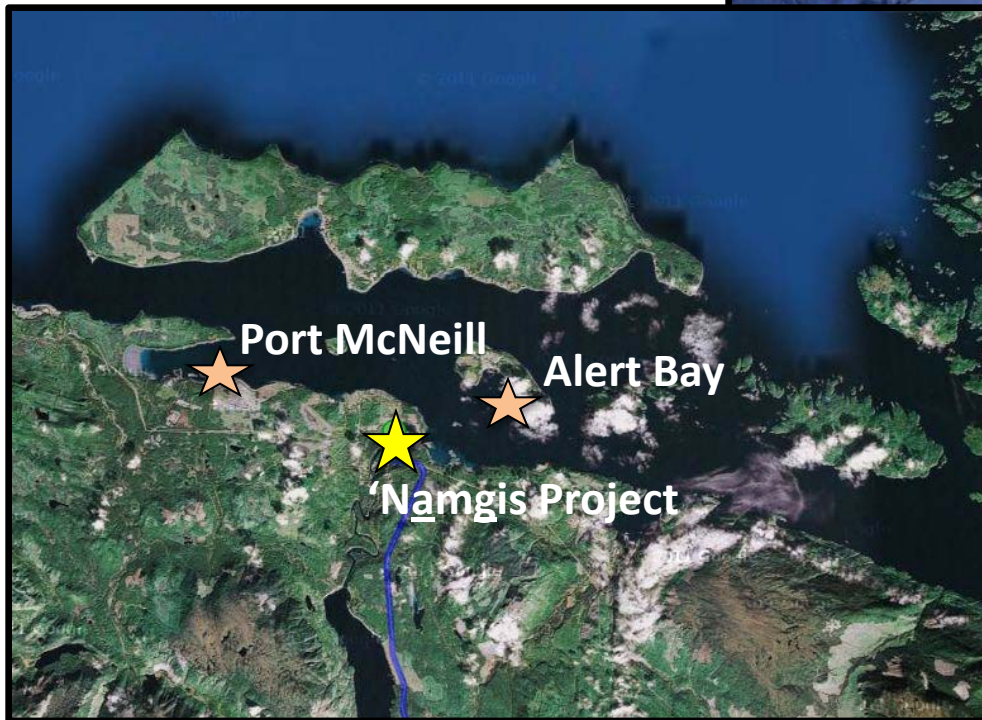
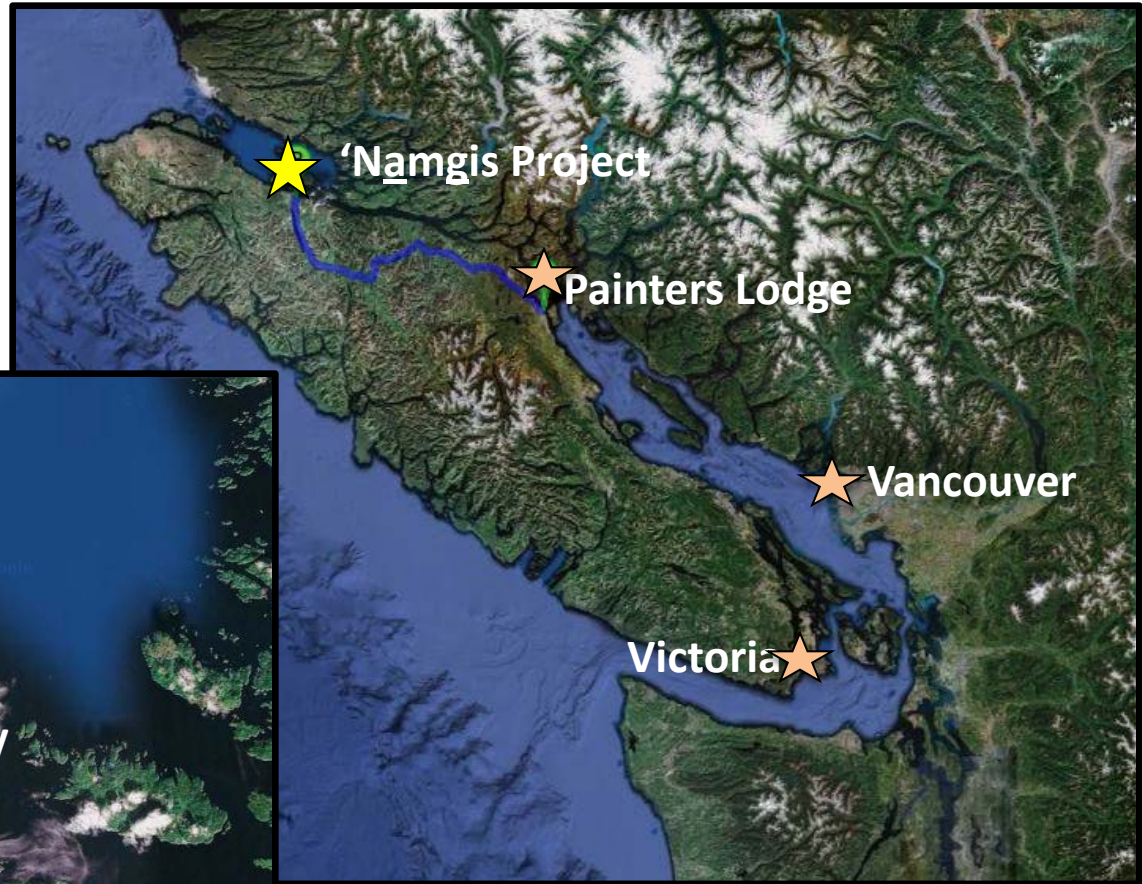
Timeline



- Site clearing to commence - November 1st, 2011
- First smolt intake - May / June 2012
- Construction complete - August 2012



Project Location





Key Site Characteristics



- Ample supply of fresh and brackish groundwater
- Three phase power nearby
- Soil characteristics good for infiltration basin
- Adjacent to Island Highway
- Second growth forest
- Within 5 km of Port McNeill
- Close to processing plant and composting facility



Pilot Project Objectives



- To confirm the biological, technical, and production parameters for raising Atlantic salmon to market size in a land-based recirculating aquaculture system
- To determine the design parameters for an optimal commercial sized facility
- To prove this technology is both technically and economically feasible at a commercial scale for Atlantic salmon
- To catalyze the adoption of this next generation salmon growing technology



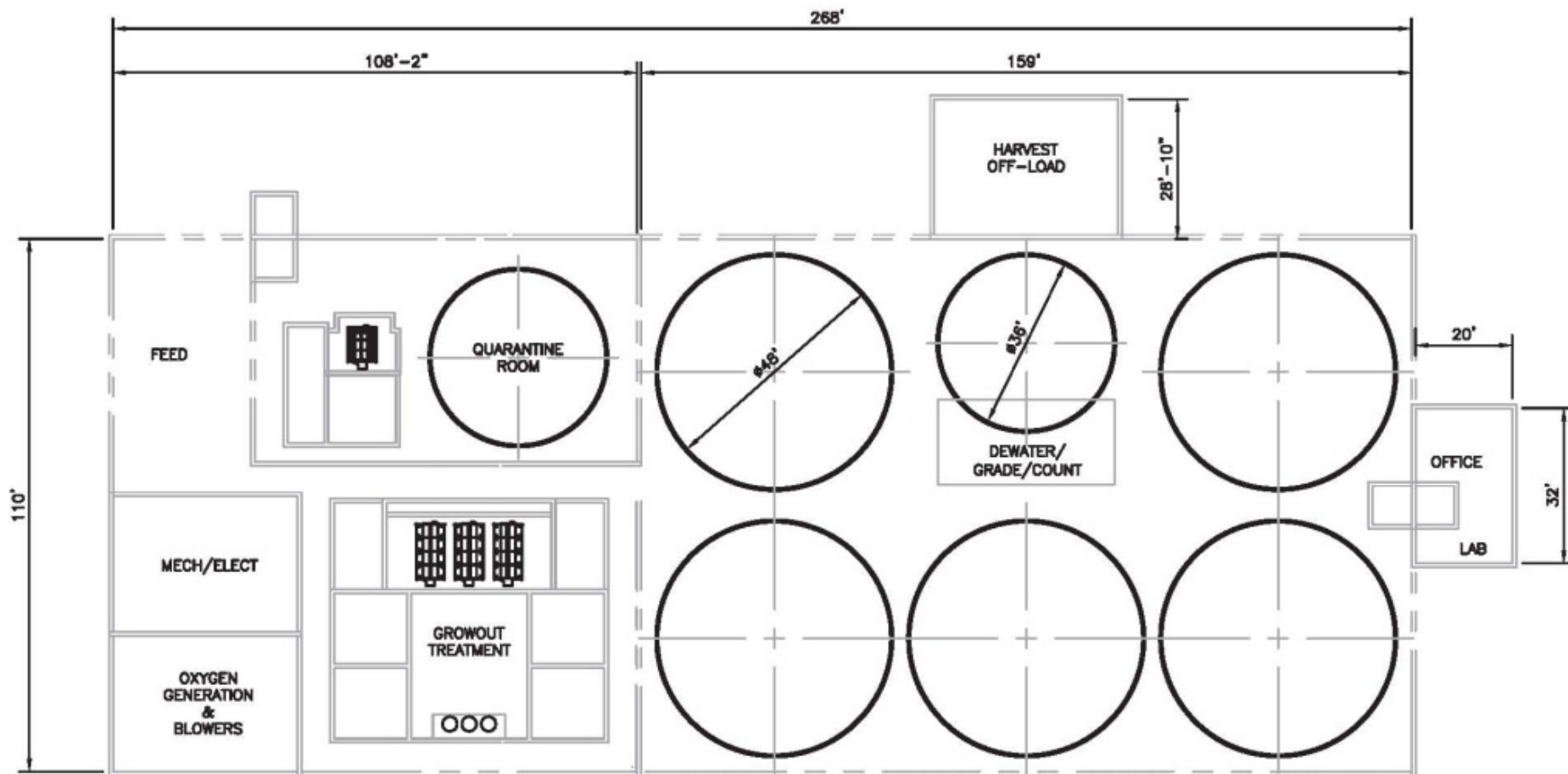
Funding



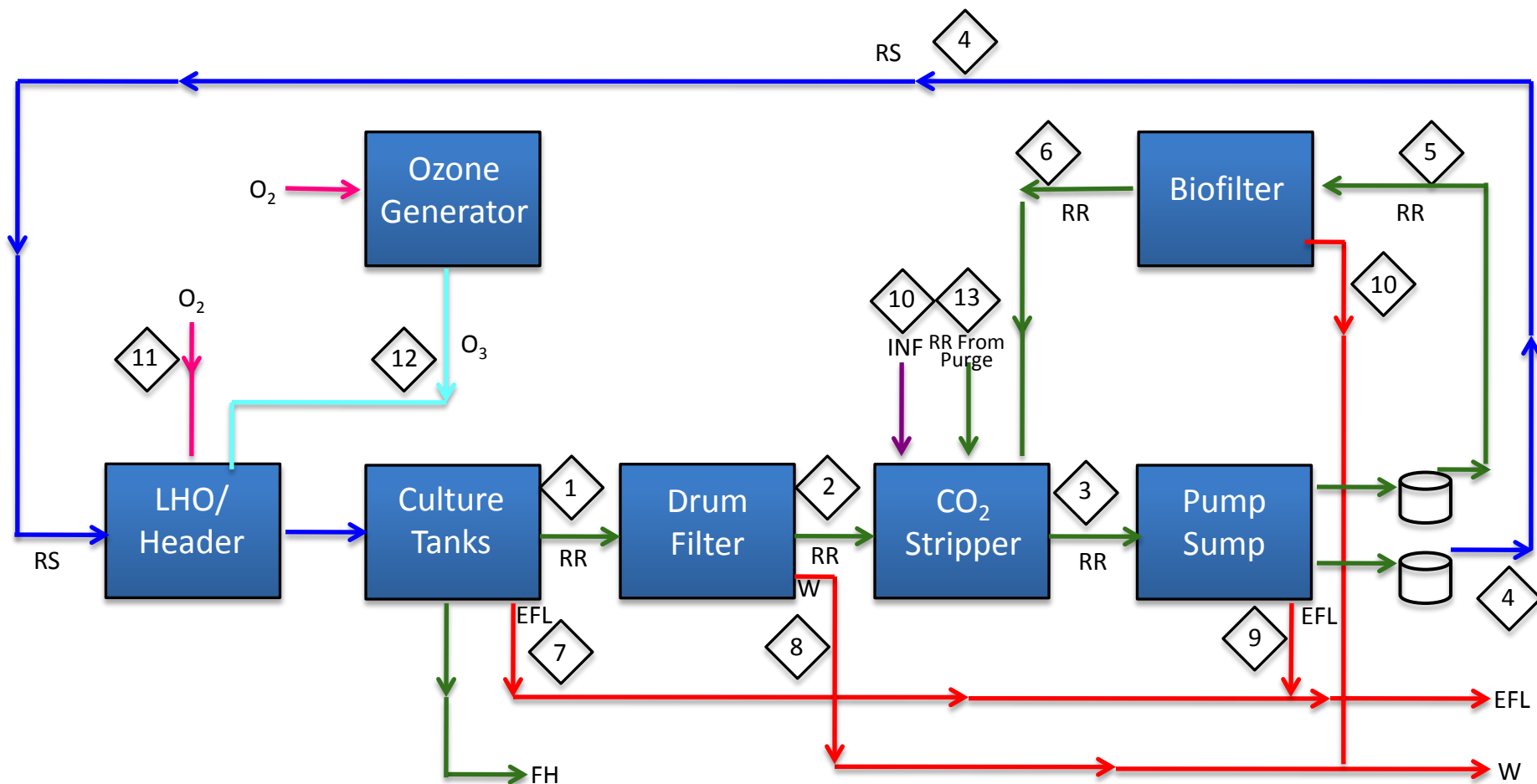
With the support of government and philanthropic funders:

- Aboriginal and Northern Affairs Canada
- BC Ministry of Agriculture and Lands (Investment Agriculture Foundation)
- Enterprising Non-Profits
- Fisheries & Oceans Canada (Aquaculture Innovation Market Access Program)
- Pacific Salmon Foundation
- Sustainable Development Technology Canada
- Tides Canada

Preliminary Layout



Process Flow - Growout





Key Performance Metrics



- **Total recirculating flow per system:**
 - Quarantine and Growout = 99%
 - Purge = 90%
- **Influent consumption rate:**
 - 23% system replacement/day
 - Maximum daily system water exchange rate:
 - Quarantine = 37%
 - Growout = 20%
 - Purge = 263%

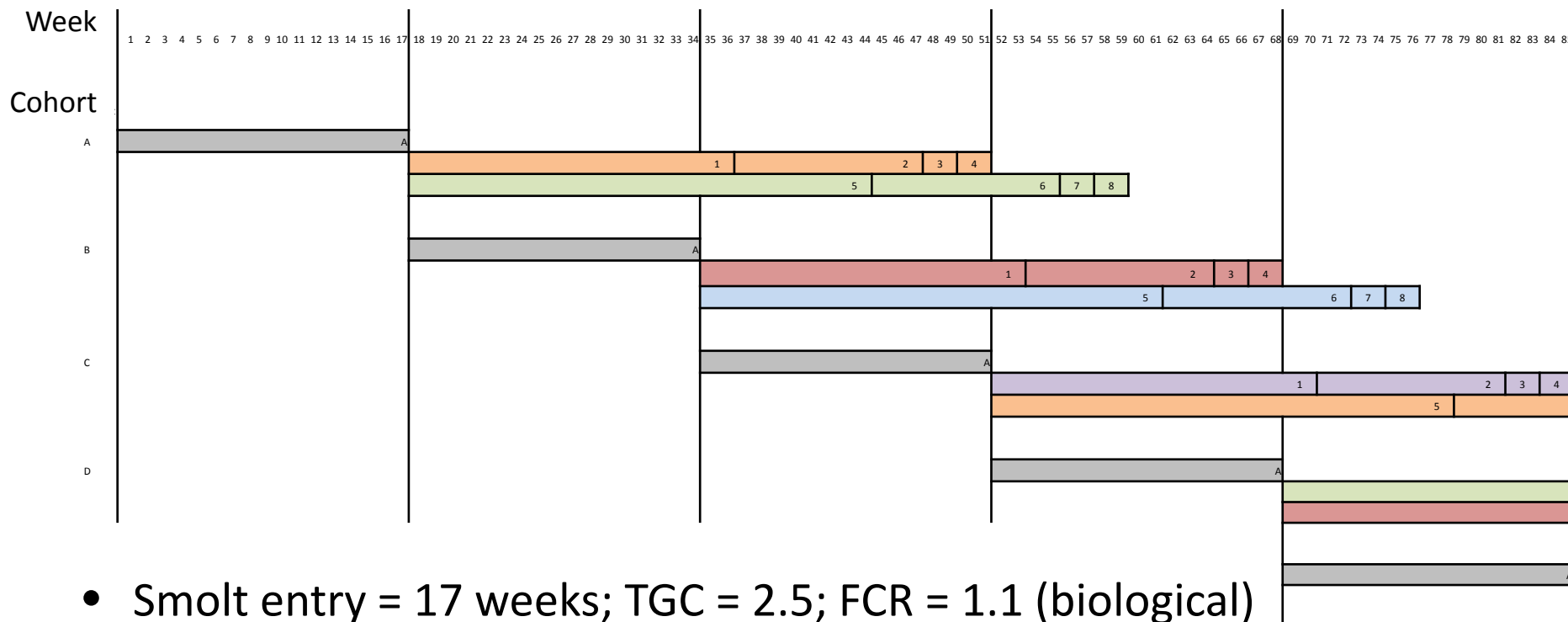


Key Performance Metrics



- **Culture tank exchange rate:**
 - Moderately adjustable
 - Quarantine = 30 min; Growout = 45 min; Purge = 45 min
- **Delta Dissolved Oxygen:**
 - Compares inlet DO to outlet DO
 - Ranges from less than 1.5 mg/L in purge to more than 6 mg/L in quarantine
 - No change in dissolved oxygen within the tanks
 - Concentration at the tank outlet (100% of saturation) is perceived by every fish in all parts of the tank

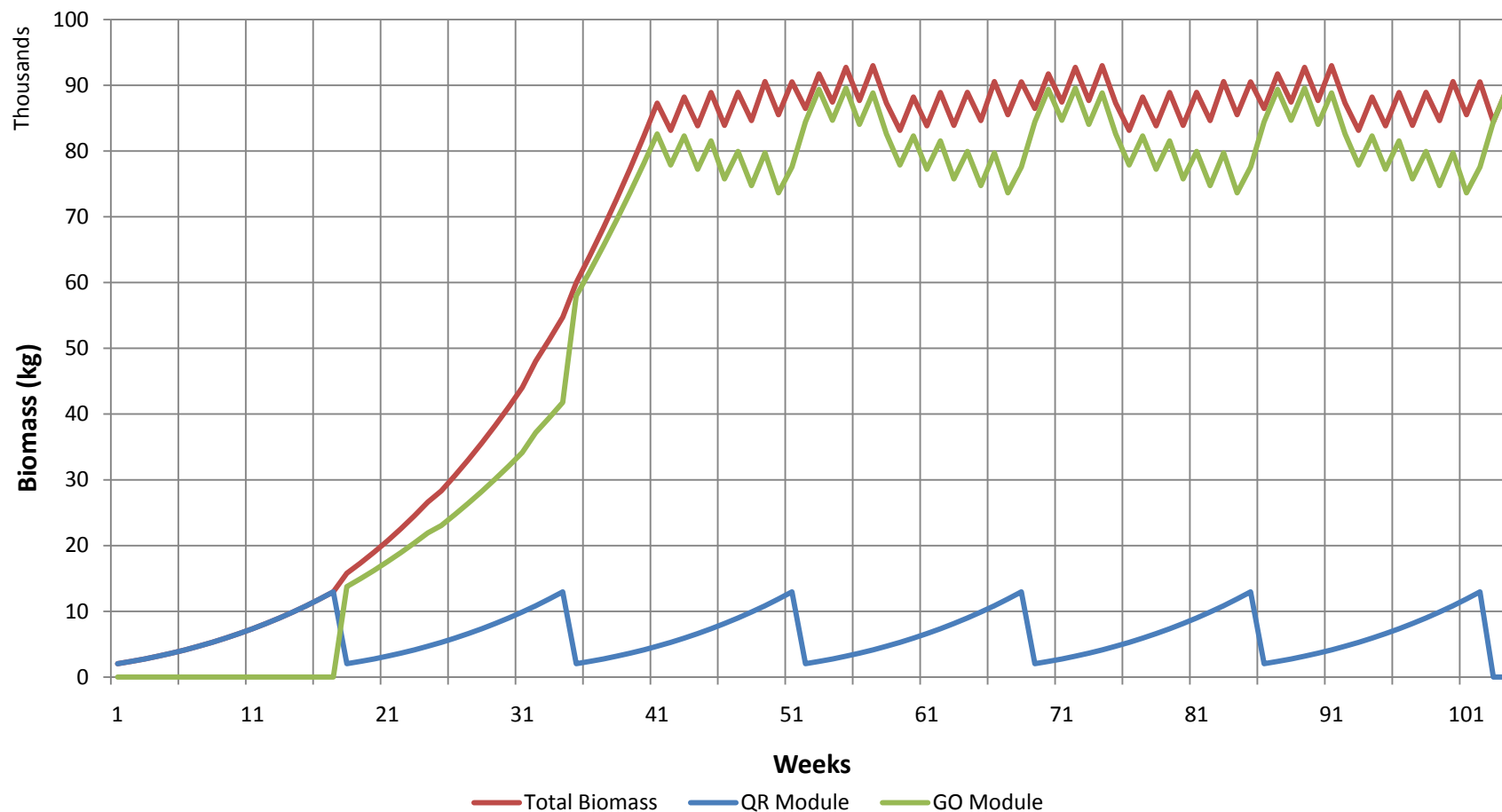
Bio-plan Flexibility: Simplified Grading Strategy



- Smolt entry = 17 weeks; TGC = 2.5; FCR = 1.1 (biological)
- Incorporate overstock and early harvest
- 230 tonnes/yr

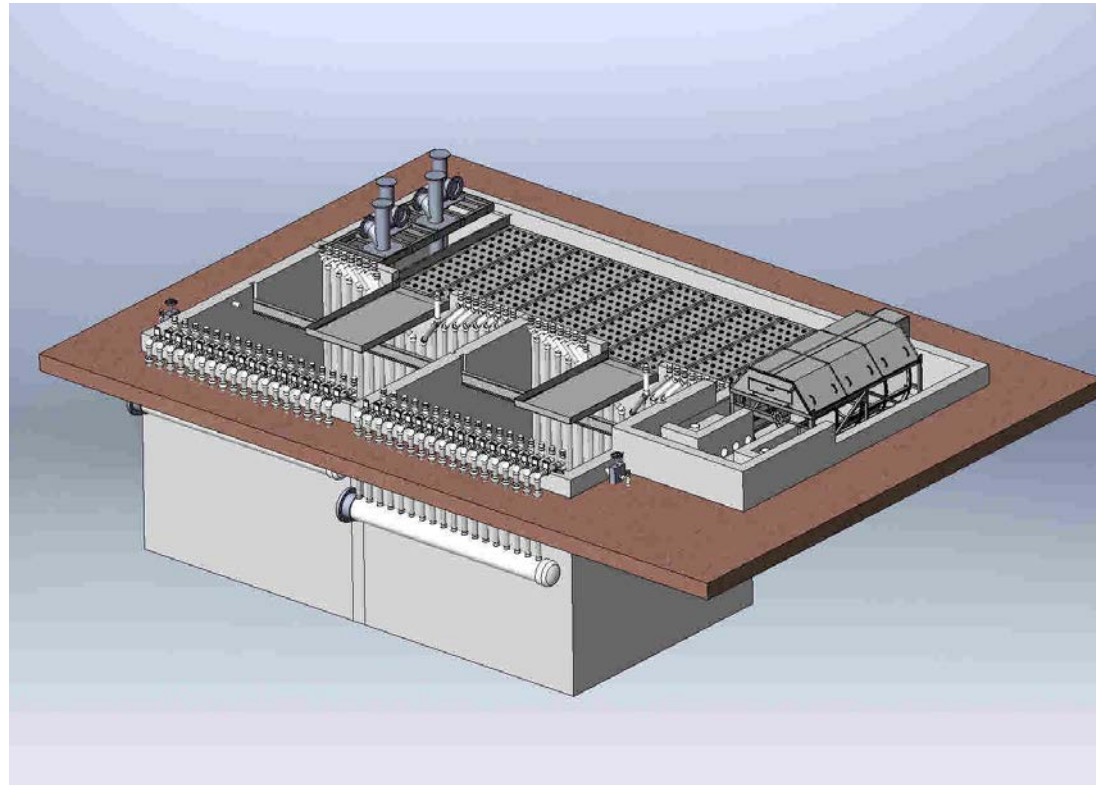
Bio-programming Results

Total Biomass





Above grade FSB RAS system



Proposed FSB RAS system



Harvest



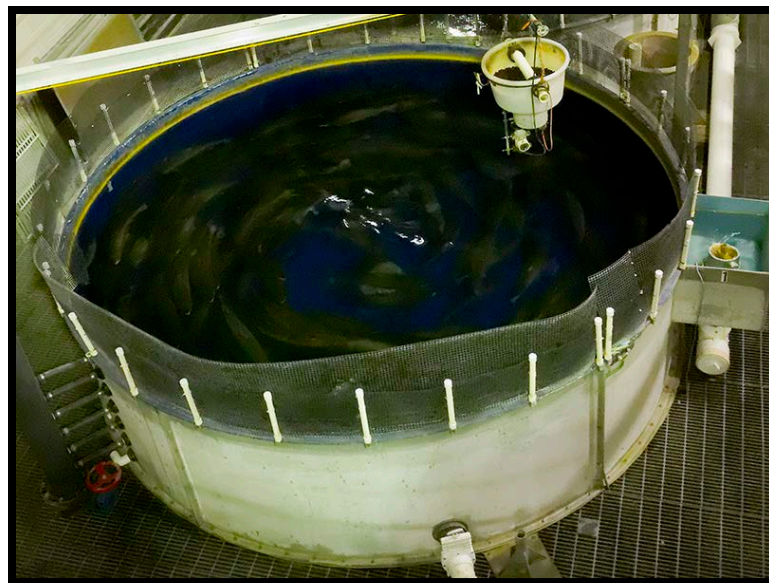
- Expected harvest size between 3 and 6 kg
- Fish handling technologies include:
 - Pump and grade 600 g smolts as they leave the quarantine system and are distributed to growout tanks
 - Move fish within the growout tank module and into the purge tank module by swimming rather than pumping
 - Trial use of grading nets and screens
 - Inducing fish movement through water flow, light, bubble nets, etc.

Harvest

- Fish held for up to 10 days in non-recirculating water to purge potential off-flavours, and starve
- Fish harvest technologies include:
 - Purge tank → dewater fish → pipe → processing area outside biosecure rearing environment
- Trial of pre-harvest chilling is planned



- **Expected capital cost**
 - \$23 / kg live weight of annual production
 - \$28 / kg HOG
- **Production cost**
 - \$7.60 / kg HOG





Project Budget



Capital (\$K)

- Civil works & main building	1,659
- RAS systems	3,437
- Design	479
- Other equipment	310
- Total	\$5,885 K

Operating (\$ / kg HOG)*

• Feed	2.25
• Labour	1.46
• Smolts	0.58
• Energy	0.74

**** Preliminary estimates prior to completion of detailed design***



Unique Challenges



- **Permitting**
 - DFO in flux due to jurisdiction transfer
 - Lack of well-developed aquaculture regulations
- **Species**
 - Atlantic salmon: non-native species
- **Multiple funders**
- **Effluent**
 - Understanding risk and mitigation of disease transfer via effluent and groundwater

Environmental Monitoring

- Aquaculture license
- Canadian Environmental Assessment Agency (CEAA) screening
- Independent Environmental Monitoring Plan (IEMP)



Lessons Learned

Partnership and collaboration



TIDEScanada
uncommon solutions for the common good



PR  **Aqua**



Technical Advisory Committee



- The **Salmon Aquaculture Innovation Fund at Tides Canada** is supported by a multi-stakeholder Technical Advisory Committee
- The **role** of the TAC is to:
 - Evaluate and make recommendations on project funding applications
 - Review interim and final reports provided pursuant to funding agreements
 - Aid in the dissemination of the research outcomes from funded projects

TIDEScanada
uncommon solutions for the common good

Performance Matrixes

- To support the **consistent and comparative reporting** of information, the TAC has developed a comprehensive set of performance metrics in the following key areas:
 - Production
 - Productivity
 - Environmental
 - Financial
 - Social
- **Within each key area the following are defined:**
 - Parameter / indicators to be measured
 - Units
 - What to measure
 - Frequency
 - Methodology






Performance Matrixes



- The **consistency and comparability of reporting** is supported by the multiple funding agencies and projects that have adopted these performance metrics in their funding reporting requirements
- **Aquaculture Innovation Workshops** are a key means to share information and results
- Through the support of the Tides Canada, the Freshwater Institute **has funding** to support closed containment projects in B.C. to the end of 2013

Future Milestones

- 
- Secure all funding
 - Hire Operations Manager
 - Complete detailed design drawings
 - Start construction
 - Intake of first smolts
 - Atlantic salmon BBQ and celebration!



Questions





Contact Information



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