

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

Aquaculture Innovation Workshop  
May 15th, 2012



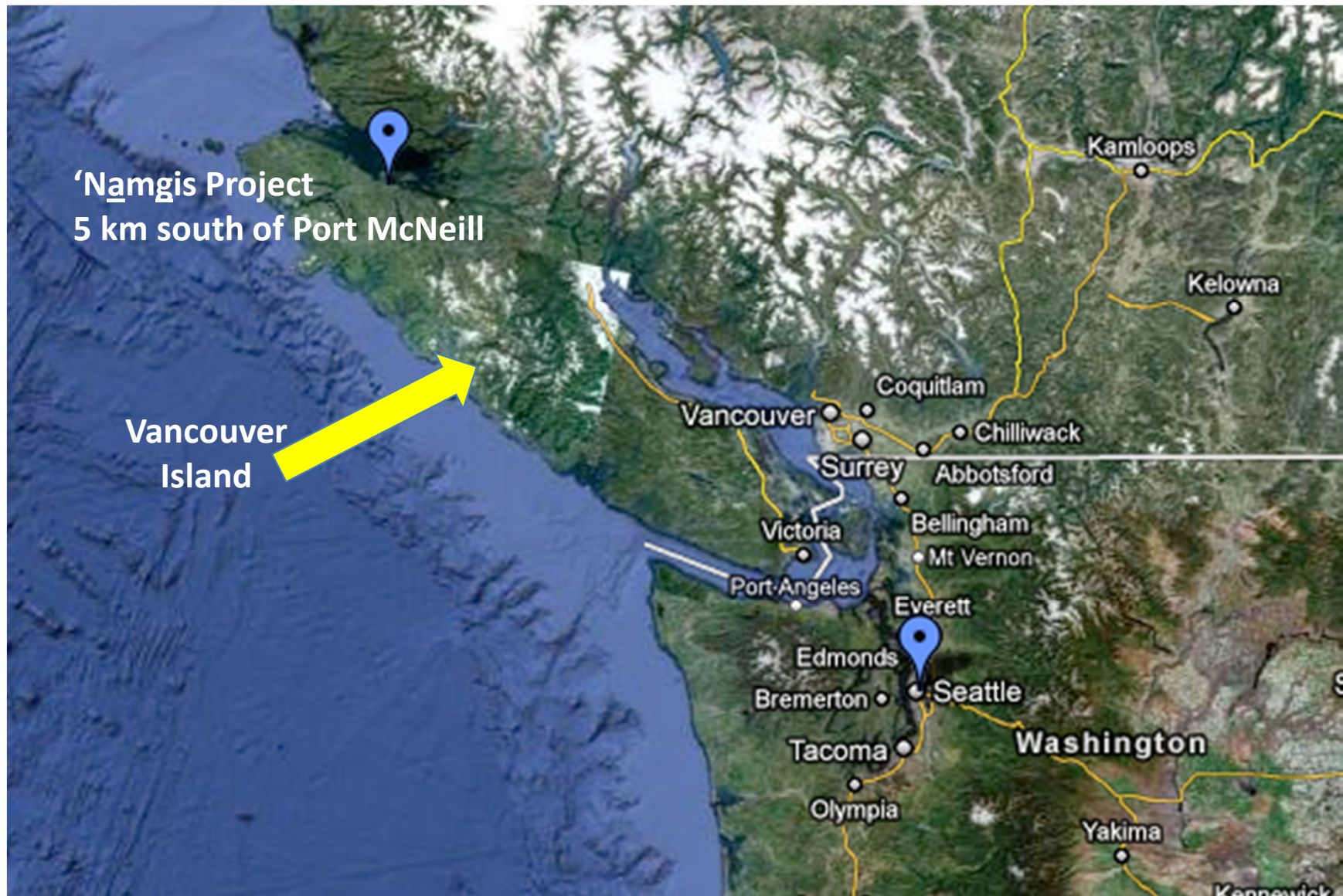
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*Save Our Salmon*



# *Project Location*



# Project Partners

**'Namgis First Nation**

**The SOS Marine Conservation Foundation**



With advisory support from:


Tides Canada

Conservation Fund's Freshwater Institute



**TIDES**canada  
uncommon solutions for the common good



**PR**  **Aqua**

# *Project Summary*

***Pilot module to show that it technologically and economically feasible to raise Atlantic salmon to harvest size in an environmentally sustainable, land-based closed containment system (commercial scale would be 1,000 to 5,000 MT)***

- Covered, biosecure facility
- 5 fish growout tanks (+ quarantine & purge)
- RAS - 80% of the water is recirculated/day
- Groundwater disinfected on entry
- Slightly saline water at 15°C
- 3 cohorts of Atlantic salmon smolts/year grown to 470 tonnes/year
- Smolts are from Canadian broodstock and “disease free”; they will undergo rigorous additional disease detection testing and be quarantined for 4 months
- Full growout to 6 kg in 12 -15 months
- No antibiotics nor pesticides will be used
- Harvest sizes of 3 to 6 kg to allow for maximum use of capacity & continuous production
- Four staff provide 24 hour/7 days per week coverage
- Capital cost \$7 million

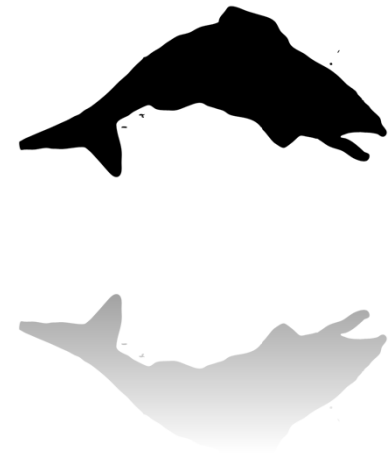


# ***Project Funders***

## **With the support of government and philanthropic funders:**

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

**Total: \$7 million**



# Timeline

- Construction has begun
- Construction complete-  
September 2012
- First smolt intake  
September 2012
- First harvest  
September 2013



# ***Environmental Monitoring***

## **External:**

- Canadian Environmental Assessment Agency (CEAA) screening
- Aquaculture license (DFO)

## **Internal:**

- Independent Environmental Monitor ***retained by the Pacific Salmon Foundation, not the proponent or government*** (funded by Tides Canada)
- Pathogen Management Plan
- Construction Management Plan
- Fish Health Management Plan
- Groundwater Monitoring Program
- Smolt Delivery Protocol

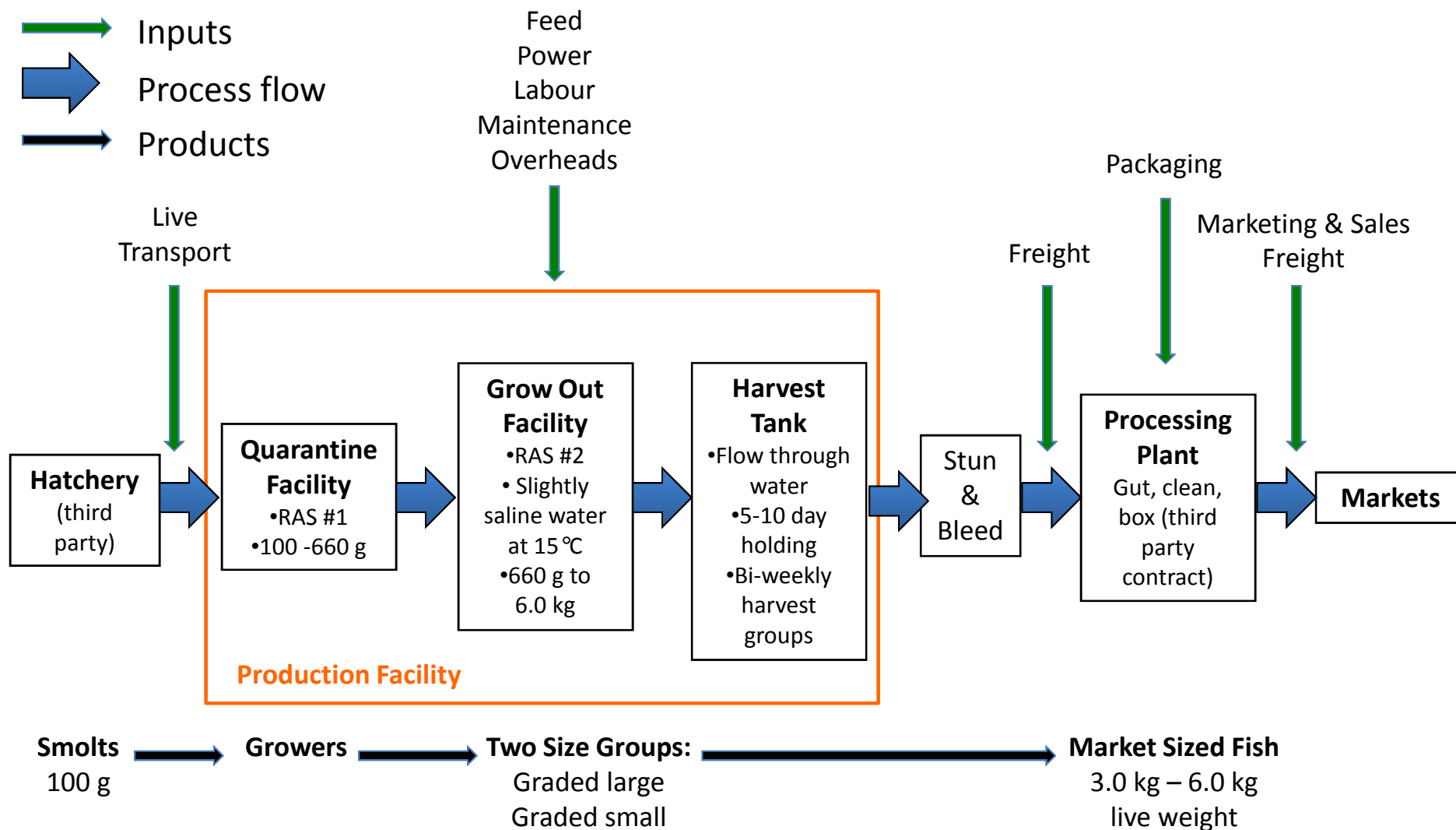


# Layout



2,870 m<sup>2</sup> (35m x 82m; 116' x 270')

# Process Flow



# ***Technologies & Equipment Summary***

- Facility housed within 1 building divided into 2 sections: quarantine & growout
- **Water** supplied from ground + UV disinfection
- **Tanks:** 5 @ 500m<sup>3</sup>; 2 @ 250m<sup>3</sup>; fiberglass; dual drain Cornell style
- **Biofilter:** PRAqua fluidized sand biofilter, below grade installation
- **Gas exchange:** Tank LHO's & CO<sub>2</sub> stripping tower
- **Feeding:** Central feeding system (pneumatic)
- **Inventory control:** Electronic counting at transfer (e.g. Aquascan), bio-scanner frame weight monitoring
- **Fish transfer:** Central pump & grading station
- **Particulate filtration:** Microscreen drum filter (80micron)
- **Heating system:** Heat pump (1 to start) using groundwater as heat source and culture tank based heating coils as destination; Energy Recovery Ventilator (ERV) used to recover heat from vented air
- **Head:** 16 feet
- **Fish harvest:** Purge tank

# ***RAS Performance Metrics (Projected)***

Water flow:

- Makeup water flushing:
  - Per unit system volume – 150 gpm; 25% of system volume/day
  - Per recirculating flow basis – 99.5% recirculation rate
- Culture tank exchange rate at different stages:
  - Growout – 30 min
  - Quarantine – 45 min
  - Purge – 45 min

# *RAS Performance Metrics (Projected)*

In tank water quality targets\*:

- Temperature - 15°C average
- Salinity – 6 to 8 ppt (influent water supply)
- Alkalinity – 75 mg/l min (controlled with NaOH)
- CO<sub>2</sub> - 12 mg/l max
- Oxygen – 100%

\*at 90 kg/m<sup>3</sup>



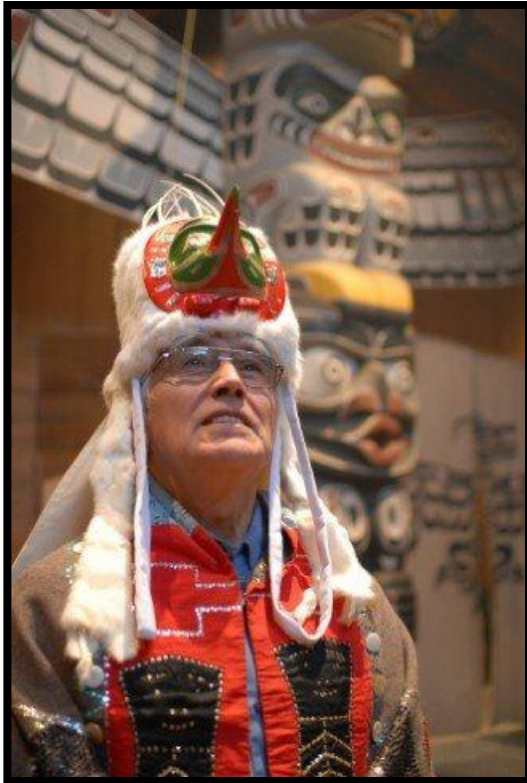
## *Biological Metrics (Projected)*

- Smolt size – 100 g (supplied by third party)
- Maximum Density - 50 (1<sup>st</sup> cohort), 75 (2<sup>nd</sup> cohort), 90 (3<sup>rd</sup> cohort) kg/m<sup>3</sup>
- FCRb - 1.05
- TGC – 2.5
- Mortality- 7.6% (including 3% cull)
- Harvest size – 3 to 6 kg
- No antibiotics nor pesticides will be used

Key Variables	Units	First Module (FM)	Commercial Scale & Optimized (CM)		Net Pens (NP)	Comments
				% Improve		
Annual Production/site	mt/yr	390	1500		1500	NP- 3000 mt every two years
Average Harvest Size	kg live	5.0	6.0			
FCR	Economic	1.05	0.95	10%	1.36	
Feed price	\$/kg	1.65	1.55	6%		FM - Natural diet, list price. CM- estimate on volume discount
Staff	FTE/100 mt	1.0	0.5	50%	0.40	Full time site staff
Power Efficiency	KWH/kg live	5.1	4.6	10%		Includes heating, O <sub>2</sub> generation, pumping, water recirculation
Smolt Cost	\$/smolt	2.7	2.00	26%		In-house smolt production
Depreciation	% of capital	5.8%	3.7%		10%	CM- Estimate from others
Wholesale price	USD/lb HOG	2.75	3.2	16%	2.75	Superior grade. CM- Premium for reliability and size optimization
Price premium	USD/lb HOG	0.7	1.0	43%	-0.3	NP- 10% Kudoa loss discount estimate
Exchange Rate	CAD/USD	1.0	1.0	0%	1.0	
Business stability		High	High		Low	

		First Module (FM)	Commercial Scale & Optimized (CM)		Net Pens (NP)	Comments
<b>Financial Summary (\$/kg HOG)</b>				% Improve		
<b>Operating Costs</b>						
	Feed	2.10	1.77	16%		
	Labour	0.90	0.45	50%		
	Smolts	0.87	0.64	26%		
	Power	0.43	0.39	9%		
	Maintenance	0.10	0.09	10%		
	Fish Health & Treatments	0.30	0.27	10%		
	Insurance	0.14	0.00	100%		Self insure
	Other Operating	0.50	0.45	10%		
	Process, package & freight	0.78	0.70	10%		
	<u>Marketing &amp; sales admin</u>	<u>0.51</u>	<u>0.46</u>	10%		
	<b>Total Production Costs</b>	6.63	5.23	21%	4.75	NP- Old number, Significant feed discount, very large economies of scale (>40,000 mt)
	<u>Corporate Overhead</u>	<u>0.06</u>	<u>0.05</u>			
	<b>Total Expenses</b>	<b>6.69</b>	<b>5.28</b>	21%		
<b>Revenues</b>		<b>7.28</b>	<b>8.21</b>	13%	5.45	Commercial scale: Larger size + increased premium
<b>Profit</b>		<b>0.59</b>	<b>2.98</b>		0.70	
Margin on sales		8%	36%		13%	
<b>Capital Investment</b>		<b>17</b>	<b>13</b>	24%	2.5	Aquaculture lease or land cost not included

# *Marketing and Sales*



- Marketing strategy currently under development
- Meetings with:
  - Marketers / branding; buyers; representatives of certification groups; and other RAS operators
- Marketing & Sales strategy by October 2012

# ***Commercialization Opportunities***

**Build, operate, and optimize the facility  
through 2 to 3 grow-out cycles.**

## **Add Value-Added Businesses**

- Hatchery
- Aquaponics
- Organic fertilizer
- Custom processing
- Transportation services
- Salmon processing & marketing company

## **Monetize the Intellectual Property (IP)**

- Partner with another First Nation
- Partner with another salmon company
- Partner with an equipment manufacturer
- Establish a turn-key salmon EPC & mgmt co.

## **Expand Facility to Commercial Scale 1,000 to 2,000 MT**

- 100% 'Namgis
- Partner with a salmon farming company
- Partner with an equipment manufacturer
- Partner with a private equity participant
- Partner with a feed and/or smolt supplier

# *Key Issues to Date*

- Engineering
  - Heating
  - Structural
  - Energy efficiency
- Regulatory and permitting
- Bioplan
  - Density
  - Grilse rate
  - Grading and handling
  - Product quality
- Marketing and sales
  - Processing
  - Pricing / quality premium
  - Market development

# Contact Information

## Garry Ullstrom

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