

Atlantic Salmon Production in Recirculating Aquaculture Systems (RAS): Economic Analysis and Feasibility

Economics Work Group
2nd Annual RAS-N Workshop
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RECIRCULATING
AQUACULTURE
SALMON NETWORK
Sustainable • Innovative



RAS Salmon Overview

RAS salmonid production represents an emerging sector of the overall aquaculture industry

→ Aquaculture Trends

- Atlantic salmon has become the leading species for marine finfish aquaculture (32.4 million pounds) in the United States
- The vast majority of Atlantic salmon consumed is imported (844.5 million pounds) (NOAA NMFS, 2020)

→ U.S. production of salmonids in RAS could...

- Generate increased economic activity (Lipton et al. 2019)
- Reduce the U.S. seafood trade deficit
- Reduce environmental impacts compared to traditional aquaculture



Stochastic Economic Simulation Model

Exploring the economics of RAS Atlantic salmon production from egg to market size in the U.S.

- Key Deliverable: Calculate ten-year Net Present Value (NPV)
 - Accounting for in-flows (sales), outflows (head-on gutted Atlantic salmon RAS production cost), and time
 - Model will consider a hypothetical 5,000MT facility
- Compare the RAS production costs and product price to similar net-pen production monetary outcomes
- Uncertainty in production performance will be captured by using Monte Carlo simulations



Data Needs

- Estimates for several cost categories for both **capital expenses** (ex. RAS technology & land) and **operating expenses** (ex. feed & electricity) of a hypothetical 5,000MT facility
- Cost categories developed through multiple discussions and collaboration of the RAS-N consortium and economics work group



Questionnaire

RAS Industry experts will be asked to provide their best estimate for plausible ranges of expenses for a hypothetical 5,000MT firm.

→ **Feedback**

- Under review by individuals familiar with both the technological aspects of RAS as well as the sales and distribution of salmonids
- Incorporated questionnaire feedback to ensure that necessary data can be collected to run the stochastic economic model

→ **Response Maximization**

- Invitation letter has been developed and an invitation strategy has been decided with a focus of response maximization
- Deploying succinct survey through Survey Monkey later this Fall



Path Forward

- Soliciting one more round of feedback on the industry questionnaire before sending to the industry (Target Date: November 2020)
 - Complete stochastic simulation model with sensitivity analyses and NPV estimates (Target Date: March 2021)
 - Pursue additional research opportunities contingent on needs identified in the panel discussion and subsequent discussions (Target Date: Ongoing)
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