



# RESTORATIVE OCEAN FARMING PROJECT

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## Introduction

In 2017, the North Coast Innovation Lab (NCIL) at Ecotrust Canada identified that affordable access to locally-produced seafoods has been a longstanding issue in Prince Rupert and neighbouring communities, despite the coastal town's location on beautiful Coast Ts'msyen territory.

The Restorative Ocean Farming (ROF) Project started in January 2019 through a partnership between Coastal Shellfish Corporation and the North Coast Innovation Lab (NCIL) with the intent of supporting marine cultures, livelihoods, and environments to enhance local seafood security. The idea for the ROF Project was conceptualized by Metlakatla Stewardship Society and Coastal Shellfish

Corporation, a shellfish aquaculture operation in which Metlakatla First Nation are the primary shareholders. Using a social innovation approach guided by systems theory, the NCIL has been adding capacity to this locally-grounded idea and project through hiring and supporting graduate students to provide the necessary research and development work to get a restorative ocean farm in the water.

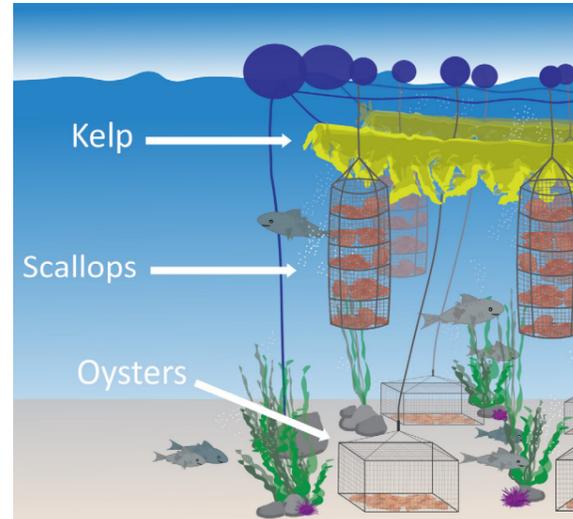
This report details the experiences, contributions and learnings that the 2020 Project Coordinator achieved while working on the ROF Project from May-August 2020 while building on the foundations and connections established by the previous Project Coordinator, Taylor Reidlinger last year.

# Context



## The Restorative Ocean Farming Project

Restorative ocean farming (ROF) is a form of innovative multi-trophic aquaculture, or farming multiple marine species in the sea rather than the land. However, what distinguishes restorative ocean farming from other forms of aquaculture is the focus on cultivating foods that grow in harmony with one another and the ocean, together in shared vertical ocean plots rather than simply farming the most profitable species. Through adopting a 3-D farming technique, which uses long lines, lantern nets, cages and other equipment, the farm will make use of the entire water column, allowing an abundance of food to be produced in minimal space.



In this project, Ecotrust Canada and Coastal Shellfish Corporation, with guidance from Metlakatla Stewardship Society, have been exploring the feasibility and local desire for growing different kelp and shellfish species at a restorative ocean farm. The potential benefits, challenges and implications of growing several kelp and shellfish species have been examined with the hope of stepping into additional marine foods in the future, such as sea cucumbers and urchin ranching. The project aims to explore the local feasibility of ROF to inform and potentially provide a foundation for a long-term and self-sustaining seafood program under the Metlakatla First Nation that enhances food security, environmental restoration, and territorial stewardship.

Shellfish and kelp are ideal preliminary farm food candidates because of the versatile benefits they offer to those who consume them and the environment in which they are grown. Kelp forests act as an important source of food, spawning and habitat for

underwater ecosystems, while also filtering carbon, nitrogen, and phosphorus, which helps prevent the ocean from becoming too acidic to support life. Kelp also has substantial nutritional benefits; the algae contains a higher calcium concentration than milk, and is a rich source of vitamin C, iron, iodine, and more. Shellfish have numerous health and environmental benefits as well, since they are packed with omegas, healthy fats, and protein. Shellfish also filter gallons of water of excess nutrients and pollutants everyday, which helps clean the ocean and prevent toxic algal blooms. Additionally, since kelp uses energy from sunlight to produce its own food, and the shellfish under consideration are filter-feeders, they are all zero-input foods. This means that the ROF method and products will remain relatively affordable as the price of feed, pesticides, antibiotics, land, water and other common food inputs continue to rise.

The urgency of building local food projects that work in harmony with the ecosystems

in which they are rooted has become especially important as the COVID-19 pandemic continues to exacerbate the gaps and failures of increasingly globalized food systems. However, without adequate research and development, the future farming operation risks burdening the community if it cannot become financially self-sustaining. To ensure that seafood security is meaningfully enhanced rather than reproducing the current dynamics of accessing seafood in Prince Rupert, the managerial and operational logics

of the future farm must be strategically designed and enacted. In this project, the species grown must be relevant to the community, feasible to grow in the local environment, and the business and distribution model must accommodate a community food program while remaining financially self-sustaining. These are all tasks that the Project Coordinator investigated while working on the ROF project in 2020, building on the work of the previous Project Coordinator, Taylor Reidlinger.

“...the COVID-19 pandemic continues to exacerbate the gaps and failures of increasingly globalized food systems.”

## Project road map



The ROF project is a years long endeavour, given the significant research and development that needs to occur to provide the necessary information and foundations to build a holistically successful restorative ocean farm and food program. Mary Williams' internship as a Project Coordinator with Ecotrust Canada and Coastal Shellfish Corporation encompassed a small, but

important part of this multi-year process. The following road map generally represents the four major areas of information gathering, analyzing, and sharing that encompassed the internship. This process was iterative and as each area of the project grew, narrowed, and deepened over the course of the internship, other project components continued to evolve.

### Part 1: Orientation

Due to the COVID-19 pandemic, the Project Coordinator began the internship working remotely from Toronto and did not travel to Prince Rupert until early July. The internship began with a virtual orientation organized by the NCIL, which included meetings between the third NCIL intern cohort and different individuals involved in the Prince Rupert community, to gain an understanding of the local context, challenges and initiatives in which the 2020 projects were operating. This was complimented by engaging with readings

and theories that inform the approach of the NCIL: social innovation, systems thinking and network entrepreneurship. These theories and readings provided general guidance regarding different approaches to maximize the improvement of local social and environmental conditions through recognizing the systems under which a project or initiative may operate, and identifying pressure points to make change; this includes social, political, environmental, administrative, economic and other systems.

The Project Coordinator also read the reports prepared about the ROF Project by the previous Project Coordinator, Taylor Reidlinger, and several of Metlakatla First Nation's resource and territorial management

documents, to better understand the priorities and challenges facing Metlakatla First Nation and the role of sustainable aquaculture in addressing them.

## Part 2: Kelp

Kelp aquaculture is an emerging industry in Canada and rapidly growing around the globe, which makes it an exciting but challenging market to step into. As the ocean is becoming more acidic through absorbing increasing amounts of carbon dioxide, our great seas are facing increased difficulties in supporting life. More research is needed regarding the exact ecosystem benefits of farming kelp, but it has the potential to offer limited protection against ecosystem and food system collapse through absorbing carbon from the ocean and performing some of the vital functions typically served by wild kelp forests. One of the benefits and challenges of farming kelp is that it grows quickly, almost too much so. Kelp is one of the fastest growing organisms on the planet, and the future farm will grow tonnes of it every year. However, kelp is also very perishable and difficult to process, which poses challenges given the emerging status of the Canadian kelp market and remote location of Prince Rupert. One of the research tasks undertaken by the Project Coordinator was finding placements for kelp products that keep up with the rate in which it grows and are conducive to the remote geography of Prince Rupert.

Diverse uses for kelp were unearthed throughout this process, such as biofuels, plastic alternatives, hydrocolloids (gelling



agent), health and beauty products, wastewater treatment, and more. However, through extensive market research, it was revealed that the technological and scientific requirements of processing kelp for most of these uses are considerable, requiring significant investment, space, labour, and time. Fortunately, there are a few uses for kelp that require minimal processing, such as fertilizers, kelp restoration projects, urchin feed, and edible kelp, including in the roe on kelp industry. These uses still hold the potential to aid in local food security and stewardship efforts.

To build on these findings, the Project Coordinator contacted kelp farmers and researched potential organizations and businesses that may have an interest in purchasing kelp for these uses to inform the kelp species, processing, and marketing that the ROF Project invests in.

## Part 3: Business, investment and distribution

Much of the seafood that is caught in Metlakatla and Coast Ts'msyen waters simply passes through Prince Rupert to its end destination elsewhere, and the fish that can be bought in this coastal town is coming

from further and further away. Through the ROF Project, the future farm aims to address food security with Metlakatla First Nation while also providing greater access to locally and sustainably produced seafood for the

Prince Rupert community at large. To do this, the structure of the business behind the farm needs to be designed to enhance local seafood access rather than reproducing the current dynamics of accessing seafood in Prince Rupert. Moreover, the farm needs to be a financially self-sustaining operation to avoid reliance on funding and maximize potential benefits with Metlakatla First Nation.

The Project Coordinator researched best practices in the governance and business structures of community-owned aquaculture ventures, particularly in remote and Indigenous contexts where there is a focus on building local food systems. Through this research, it became clear that there are a few conditions that are often central to the success of new businesses and food security projects — the integration of local culture, community support and buy-in, significant investment and contingency plans for the first few years of operation, predictable operating environments, diversity of revenue or products offered, separation from local politics, and sufficient local infrastructure and capacity. One of the options for distribution of farm products is to sell half of the food produced at discounted rates through a community food program, which will be financed by selling the farm products through traditional commercial avenues. Another option is to start a community-supported aquaculture operation in which people and

businesses buy shares in the farm at the beginning of the year, or the harvest season, and they will receive a set amount of farm produce each week, or month, to pick up or it's delivered. This model reduces food waste and risk for farmers through determining and securing purchase quantities at the beginning of the year. Food programs can be supported by the community-supported model through organizations buying a number of shares in the farm to distribute through a local initiative.

Further research examined regional businesses and organizations that could be interested in the foods the farm will produce to understand the market implications of adopting particular distribution models. The Project Coordinator also explored organizations that could be collaborated with to enhance and diversify the services offered by the farm in the future due to the importance of variety and networks in projects such as these. If the community-supported aquaculture operation is pursued, it would be one of the first ocean farms of its kind in Canada.

The Project Coordinator examined the most relevant food production operations in Canada and around the world to compile learnings that could be applied to the restorative ocean farm, such as ideal distribution and pick-up models, subscription options, share prices, and best practices in retaining farm subscribers.



## Part 4: Outreach

Community and investor buy-in are key components to starting a restorative ocean farm and ensuring that it is best set to meet community needs. Various presentation materials were prepared to engage diverse investor, consumer and stakeholder audiences, and several presentation feedback processes occurred, which helped capture the most interesting and effective ways to share the ongoing story of the ROF Project. Visual tools were developed to aid in explanations of restorative ocean farming and the ROF Project to different audiences. When performed with thought and nuance, outreach can be a deceptively important tool in projects such as these, as it provides an opportunity to identify and address some of the more abstract hurdles that the project must face in order to maximize its success. One of the major barriers to sustainable seafood consumption in Prince Rupert and Metlakatla is certainly a lack of affordable, accessible, and reliable local seafood channels, but another is that of seafood literacy.

To ensure that the future farm and

community food program achieve their objectives, work must be done to ensure that consumers have the knowledge, skills, attitudes and tools to prepare and enjoy seafood in ways that are meaningful to them. Colonialism, climate change, and industrial food trends have impacted local access to and connections with food networks, land and knowledge systems, which are all important to food literacy and mobilizing on the connections between diet, well-being, the environment, and culture. There is no perfect food security project and addressing food literacy will take time and effort on

multiple fronts.

COVID-19 halted the possibility of holding in-person workshops about the ROF Project and the species it will produce. However, preliminary research and limited coordination with ROF actors, chefs, and local food harvesters was conducted to provide the preliminary groundwork to facilitate educational opportunities regarding sustainable seafood production and consumption when it becomes safe and smart to do so.

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## Project outcomes



The ROF Project is large and ongoing, with many of the benefits and outcomes yet to be materialized. However, through the process of conceptualizing what a restorative ocean farming program may look like and identifying local businesses that may have an interest in purchasing kelp and shellfish products, some

positive outcomes can already be seen.

- **Kelp information and reports:** Reports were prepared to inform decisions regarding which kelp species are the most feasible to grow on the future farm and the implications and possibilities of growing such species. This included the potential



end products, processing requirements and market conditions of growing and selling different kelp species. Through this research process, in conjunction with kelp pilot experiments at Coastal Shellfish Corporation, and with the advice of relevant aquaculture experts, the Project Coordinator narrowed down the best kelp species to grow on the farm, while providing foundations to market and sell kelp locally.

- **Business and governance resources:** Written and graphic materials were assembled based on literature reviews regarding business and governance considerations for community-based aquaculture projects, particularly in Indigenous contexts. Key learnings were compiled regarding best practices in locally grounded food security projects to inform conceptual and practical project decisions.
- **Network growth:** Relationships were pursued with various actors in sustainable aquaculture, research institutions, and community-supported food production to support the development of the ROF Project. Asset maps were created that encompassed project stakeholders, potential customers and organizations to explore synergies broadly and for specific purposes, depending on the structure, needs, and offerings of the future farm.

A reliable network of project supporters, partners and advisors is important in every aspect of developing this farm.

- **Funding opportunities:** Funding charts that outline grant makers, grants and investment opportunities to fund the initial start-up of the restorative ocean farm were amassed. Identifying common priorities across funders also helps shape the way in which the ROF story is told. With help from Coastal Shellfish Corporation and Metlakatla Stewardship Society, administrative tasks like budgeting were performed, to assist in the grant application process.
- **Public-facing research and engagement:** Visual and written tools were prepared to aid in the future engagement of project stakeholders, the general public, businesses and investors. Several methods of engaging and involving stakeholders in the ROF Project were investigated and prepared to ensure that the future farm and program are best suited to meet the priorities of local communities, while remaining a financially viable operation. Independently and with the rest of the third NCIL cohort, the ROF Project Coordinator also engaged in information sharing through a blog post, radio appearance, and presentation for a community TV channel to raise excitement and awareness regarding the ROF Project.

# Key learnings



## Environmental and financial sustainability

Through the ROF Project, there is an opportunity to get ahead of future sustainable food trends while serving as an example of what a community-based aquaculture food security project looks like. To do this, the ROF Project must become financially self-sustaining to maximize benefits for project stakeholders and to avoid becoming dependent on the grant-seeking process. Throughout the course of the internship and under the guidance of Coastal Shellfish Corporation, valuable insights were gathered regarding the ways managerial and operational logics can be leveraged to build socially innovative, financially self-sustaining, operations embedded with values that support marine livelihoods and cultures. Businesses can

inherently privilege and propagate social and environmental indicators of wealth, while remaining economically feasible if they are designed with care, thoughtfulness, and strategy.

Collective capacity, healthy environments, sustainable infrastructure and resilient food systems will become increasingly incalculable assets in rural, remote, and Indigenous communities as climate change and globalization continue to pose challenges to livelihoods and cultures. Through fostering socially innovative work within and between organizations in Prince Rupert, small yet continuous impacts can be made locally to better meet the needs of communities and environments.

## Food security

The ROF Project Coordinator adopted an understanding of food security that envisioned affordable and reliable access to healthy, culturally appropriate, and fulfilling foods in communities that are produced locally in ways that work in harmony with the surrounding environment. However, what this means in practice can be contentious and complex. It was an enriching experience to mobilize varied understandings of food security in diverse contexts and environments. Food is an incredibly personal, yet communal, component of living and so ideas of how to achieve food security understandably vary

between different people, organizations and communities. Through this project, the need to address food security urgently must be balanced with ensuring that the food and species grown are relevant to the community, help the environment and provide pathways for community involvement and employment. This is where flexible, innovative and forward thinking managerial logics become an exceptionally important tool through providing opportunities to produce locally-desired foods like cockles for the community, which could be financed by selling more profitable products like oysters through traditional commercial avenues.

“ **The need to address food security urgently must be balanced with ensuring that the food and species grown are relevant to the community...** ”

It became clear throughout the internship that food security is as much a process as it is a project. While there is no perfect food security project, to have any semblance of

## Capacity and collaboration

Building an idea, operation or industry in a remote and rural context brings a unique set of challenges, and there are often additional barriers in terms of local capacity and conditions. Access to markets is a persistent issue. As a food security initiative, the ROF Project is looking to both enhance local food systems while disrupting globalized food production. However, there are significant implications of trying to build an initiative that fosters local food production when the population in the region is relatively small. Species selection, processing decisions and food distribution must be especially strategic under these conditions, particularly since infrastructure costs can be more expensive. The potential labour pool in Prince Rupert is much smaller than in other parts of Canada which may produce employment challenges and in turn mean that the future enterprise needs to prepare for substantial training expenses for employees, depending on how the operation intends to grow. However, training incoming staff may enhance the social benefits of the future ROF program while also aiding in the development of restorative ocean farming as an industry and local food production project.

One of the missions of Coastal Shellfish Corporation is to create an ocean-based economy of inclusion for Indigenous communities through conducting the most sustainable fishery on the planet. Enterprises focused on social, environmental, and economic indicators of wealth will often face diverse challenges due to the inherently complex nature of the outcomes desired. Food security projects locally grounded in remote communities are entangled with, and impacted by, many of the same systems that have shaped life for residents of the

holistic success, initiatives must be rooted in local conditions, capacity, infrastructure, cultures, systems, and priorities, which can be a challenge in rural and remote contexts.

North Coast of British Columbia, including neoliberal capitalism, globalization, climate change and colonialism. However, there are a multitude of organizations in the Prince Rupert area and beyond that are focused on improving the well-being and conditions of local communities and environments, which is where a systems-thinking approach is especially salient.

Many initiatives focused on enhancing the resiliency of northern communities would benefit from working with other actors that may or may not work in a similar niche but share complimentary missions and ideals. This is not a revolutionary idea and many communities would already engage cooperative work if possible. There are often practical challenges that prevent collaboration between organizations such as local politics, competition for funding and resources, and a lack of personnel to manage inter-organizational relationships and projects. This signals a need to create more spaces and mechanisms, like the NCIL, to incubate ideas that foster collaboration and reciprocity between different actors with the intent of building collective capacity — which is increasingly important during these uncertain times.



## So what?



### Iteration and innovation in times of uncertainty

The COVID-19 pandemic turned a great idea for food security into an urgently necessary one, as the virus continues to threaten globalized food systems while international trade and labour practices are forced to pivot. Remote communities have long confronted the externalities of globalization, with increased difficulties in harvesting wild foods and expensive prices for processed and whole foods in grocery stores. At the beginning of the pandemic, grocery stores in Prince Rupert were cleared of fresh foods, which is especially concerning given predictions that global crises and pandemics will increase in the years to come. The COVID-19 pandemic shaped many large parts of the 2020 ROF internship, from working remotely to preventing in-person events with project stakeholders. While it is often assumed that economic, environmental, and social stability are required for investment and development in projects to occur, it is during times of precarity and uncertainty that innovation is needed most.

Food security challenges will continue to escalate in so far as local food systems fail to be revitalized, and systemic barriers to healthy and fulfilling food access continue to be ignored. While the ROF Project alone will not solve seafood security, it is one step in the direction of building local conservation-based economies that provide for life. There is a lot of work that still needs to be done on the existing foundations of the ROF Project, to build a financially, self-sustaining, ocean farm with a meaningful community food program. It needs to be decided who will own the future farm or if it will be a new enterprise entirely. Funding needs to be secured for the initial start-up costs of the future farm. Distribution, processing and species decisions need to be made based on

further scientific trials and market research, along with extensive marketing and the years-long process of growing the actual foods. However, throughout the course of the ROF internship, the immense value of patience, persistence and iteration became clear. As progress was made in each of the major components of the ROF Project, organizational and project dynamics continuously evolved to more effectively build a robust foundation for the future operation that better meets the needs of the local community and environment. It is absolutely imperative that individuals and organizations work together to challenge the business-as-usual approach to food production right now. Sustainable seafood systems must be rebuilt with roots in the principles of integrity, justice, compassion, and resiliency, while continuing to learn, grow, and innovate based on their surroundings. The survival and health of marine communities, cultures, and environments, are important to livelihoods and well-being across the entire country, and through the ROF Project there is an opportunity to become a leader in growing the foods of the future on the farms of the future.



## Project Coordinator

### Mary Williams

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Mary Williams is pursuing a Masters in Environmental Studies, with a concentration in Perspectives on Aquaculture and Indigenous Resource Management. Her research and work are centred on exploring innovative and regenerative ways to farm and harvest our great seas while supporting marine food systems resilience and cultures in coastal communities. Through her research, work, and volunteering, she hopes to contribute to the advancement of food production systems and conservation-based economies that value social, environmental, and economic indicators of wealth.



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