Project Status Update (Second)

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Cultivation protocol for the indoor cultivation of Pacific Dulse, *Devaleraea mollis* from Alaska

Since our last update, we have made notable progress with both the manual and the associated deliverables. We established collaborations with Oregon Seaweed and Dr. Ford Evans at Oregon State University. In early July, MSc. Muriel Dittrich together with Jessica Whitney (AMRTC) and Mari Fester (CFOS student) met with Chuck Toombs, founder and CEO of Oregon Seaweed, and completed site visits to both company's farm locations on the Oregon Coast. On the same trip, they visited Evans's research lab. At each of the three sites visited, the team engaged in detailed knowledge exchanges related to dulse economic, market opportunities, and overall industry bottlenecks. The exchange allowed understanding key differences in our approach to production while at the same time comparing our harvest (quality and quantity) to what the market currently offers.

As a byproduct of the visit, we decided to include additional yield information in the manual. To this end, we will complete pilot studies in the coming weeks to improve our techno-economic analysis. These experiments will provide an initial and realistic assessment of the economic feasibility, scalability, and profitability of dulse indoor cultivation. As noted in our previous report, Dr. Schery Umanzor and MSc. Muriel Dittrich will continue advancing all deliverables following Dr. Tiffany Stephens' departure from UAF.

Work Completed to Date

1. **Deliverable One – Review of Existing Indoor Cultivation Protocols for Pacific Dulse**
    - ✓ A comprehensive review of indoor dulse cultivation has been completed. This review draws from UAF Mariculture Lab's ongoing research and insights from other land-based farming operations in Norway, Baja California, California, and Oregon.

- ✓ Our protocol draft includes cultivation strategies from Baja California, which are in general terms, low cost, and readily applicable to Alaska.


Photos: Left) Fiberglass indoor tumble culture tanks at UAF Lena Point Facility. Right) A handful of monocultured dulse harvested weekly

- ✓ Participated in an in-depth exchange of knowledge and technology between commercial dulse facilities in Oregon, including two commercial operations in Bandon and Garibaldi and collaboration with Senior Research Associate Ford Evans at Oregon State University.


Photos: Oregon Seaweed's first facility in Bandon, Oregon (left) and Oregon State University's Hatfield Marine Research Station in Newport dulse tumble culture (right).

2. **Deliverable Two - Development of Cultivation Protocol**
   - We have successfully drafted 80% of the protocol's content, which now includes an additional section than originally planned.

- A graphic designer is collaborating with us to enhance the document's clarity and presentation.
- Once refined, we will seek feedback from colleagues to ensure its clarity before adjusting the language to the broader audience. Our aim is to reduce or eliminate science- heavy jargon. Once we have reviewed a simplified version, we will finalize details before sharing the first final draft with SEC.

3. **Deliverable Three - Conduct an economic analysis that will compare production costs for dulse cultivation**
    - We have identified all the key components for dulse cultivation in Alaska based on previous cultivation protocols from UAF studies and site visits in Oregon.
    - We are 80% complete with a round of pilot studies to determine costs for dulse production that include labor, infrastructure, utilities and maintenance to determine feasibility of indoor cultivation.

Remaining Tasks

- **Finalize and Refine the Cultivation Protocol**: While the draft is nearly complete, the next steps include finalizing design elements, incorporating peer feedback, and ensuring that the document is both informative and visually engaging.
- **Finalize Economic Analysis**: We are conducting multiple experiments to determine production of dulse in pounds based on the commercial setup we have at UAF.

In Brief

With 30 operational tanks, Oregon Seaweed is currently the largest land-based seaweed farm in the United States. Their experience and scalability offer valuable perspectives for refining our own cultivation methods. It is important to note, however, that year-round cultivation of Pacific dulse in Alaska is unlikely to be feasible entirely outdoors, as it is in Oregon. During our site visits, we gained useful insights and were able to compare our cultivation approaches with those employed by Oregon Seaweed.

Overall, we have continued to make steady progress. Deliverable One has been completed, and Deliverable Two is nearing its final stage. Within the next few weeks, we will finalize data collection on setup and operational costs to produce a simplified techno-economic analysis for Pacific dulse cultivation in Alaska. This will also allow us to evaluate operational cost differences across various regions of the state. Once these tasks are complete, Deliverable Three will be finalized, and preparation of the manual for Deliverable Four will begin.