

# Business Report for Pacific Purple Urchin and Dulse Co-Culture Ranching

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As capture fisheries plateaued in the 1990s (FAO, 2022), aquaculture has grown to meet seafood demands for products that are difficult to get from wild fisheries. The state of Oregon has limited aquaculture investment and development currently. The Oregon Aquaculture Explorer (OAE) is a GIS based website that allows interested parties and investors to find locations in Oregon that are best suited to aquaculture. Through the OAE, users can get detailed reports on sites including information about ownership, utilities, floodplain and salmon habitats, and average weather. Using this report, a basic financial report can be created for one of three species models: Sturgeon and tilapia in RAS systems, and hybrid bass in pond systems. These financial models are helpful to prospective investors and operators as they can outline financial expectations for the first five years, which can be used to obtain investment and operating capital through banks or private investment. In order to build new models, research needs to be done into new species and systems, as the OAE team is interested in having models for all different sizes of operations and investment. In this paper, I researched the business model of co-culturing Pacific Purple Urchin, *Strongylocentrotus purpuratus*, and Pacific dulse, *Devalarea mollis*, in a modified flowthrough system.

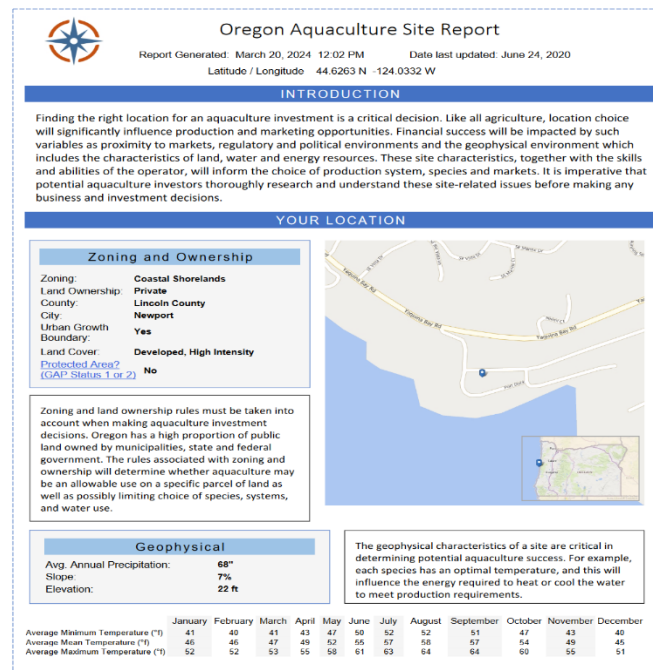


Figure 1 Site Report from Oregon Aquaculture Explorer

Sea urchin roe, called uni in Japanese, is a delicacy in many countries. Due to demand for uni, many species that are local to those areas have been overfished (Stefansson et al., 2017). With stocks overharvested, there is a demand for high quality uni from less commercially exploited species (McBride, 2005). Because of their small size, and sharing space with a larger, more fished species, the red urchin, *Mesocentrotus franciscanus*, there has been little previous interest in purple urchin. Recently, due to changing environmental conditions and a loss of natural predators, purple urchin populations have boomed along the Oregon coast. When the population gets too large, urchin barrens may form (Angwin et al., 2022). Barrens are areas where the urchins have eaten all the seaweed in the area, especially the holdfasts for kelp. This results in losses of kelp forests and seaweed, and underweight urchins that do not have any market value. The goal of this project was to model an experimental farm scenario to see if collecting the urchins and fattening them up before harvest in a co-culture with dulse would be

viable. In the model, which is based on an experimental farm in Bandon, OR, uses the dulse as a biologic water filter as well as growing dulse for a secondary product to sell. The financial model was created using prices found online for all capital and operating expenses, as well as sale prices for both urchin and dulse. Some cushion was added to both the expenses for overage, and to the sale price of live urchin. While the only readily available urchins are selling for \$10 apiece, the sheet below is based on \$8.75 an urchin. The farm was modeled in two sizes to determine if creating a bigger farm would see producers deriving more value, which it did. As seen in the figure below, both models are profitable, with the large farm making much more financial sense for investment.

<b>Production</b>	<b>Small Farm</b>	<b>SF</b>	<b>Large Farm</b>	<b>LF</b>
Urchins (Whole)	16000	\$140,000.00	64000	\$560,000.00
Dulse (Wet weight, lbs.)	960	\$19,200.00	3840	\$76,800.00
Gross Sales Revenue		\$159,200.00		\$636,800.00
<b>Capital Expense</b>				
		<b>Total expense</b>		
Equipment		\$20,000.00		\$65,000.00
Build out		\$10,000.00		\$25,000.00
Site Prep		\$5,000.00		\$20,000.00
Permitting		8,000.00		15,000.00
Total CapEx		\$43,000.00		\$125,000.00
<b>Operating Expense</b>				
Feed and livestock		\$18,200.00		\$70,000.00
Labor		\$34,000.00		\$98,000.00
Utilities		\$1,500.00		\$3,500.00
Rent		\$40,000.00		\$120,000.00
Shipping		\$9,000.00		\$15,000.00
Interest		\$7,900.00		\$21,000.00
Total OpEx		110,600.00		327,500.00

Total Profit	48,600.00	309,300.00
Breakeven Price per Urchin	\$6.91	\$5.12

In addition to being profitable for operators, removing purple urchins from barren areas has proven effective in other locations, notably in California (House et al., 2017). Once the urchins are removed or reduced to natural population levels researchers found an increase in kelp, which is not only important for the ecology of the area, but can also act as a carbon sink in the ocean. They also found an increase in other commercially valuable species (red urchin, abalone, sheepshead, kelp bass) in the restored kelp, which could help other fisheries as well.

With the profits and the environmental aspects of this project being positive, the paper outlines the risks as well. Uni is not popular in the US yet, and there is currently no commercial market for purple urchin uni. In addition, there is no current fishery for purple urchin. These make the project important, as there is no reason for a fishery or a market to develop for urchins unless it makes financial sense to do so. In addition, the report outlines other considerations and makes some recommendations of alleviating some of the issues, such as location, permitting and labor. These include removing the purple urchin commercial license from the red urchin license, streamlining aquaculture applications and creating funding for new aquaculture ventures in the state.

In the end this report found that if markets can be found, a fishery established and permits obtained, co-culturing purple urchins and dulse can be lucrative. I do not expect this model to draw interest from large scale investors or large aquaculture companies, but there is potential for small to medium size investors and local operators. I also believe this makes a lot of sense if

the operator is already in the seafood industry, where adding urchin and dulse production makes sense in vertical integration to their business.

#### References:

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