The oyster industry in Oregon: Its challenges and its potential

A summary overview
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Introduction

Oregon State University has one of the most sophisticated and productive oyster research programs in the world. During the past 42 years, scientists have been developing and applying techniques that address the many challenges of raising oysters in Pacific Northwest environments and selling them in a global market. This summary provides:
(1) **background** both about this industry and about Oregon State University's research in support of oyster farming in Oregon;
(2) an **overview of the markets** to which most of the research discoveries contribute,
(3) an **economic estimate** of the current and potential value of the research to industry,
(4) an **example of a benefit** provided by the industry that is outside the profit-and-loss considerations of the market, and
(5) a few **options to consider** that could enhance the economic effects of the oyster industry.

Background

In the mid-19th century, settlers from the East Coast discovered gold in California, and oysters in the State of Oregon (Yaquina Bay) and the Territory of Washington (Shoalwater Bay, Willapa Bay).[2] Thus began a struggle that continues today to establish and grow a commercial oyster industry in the Pacific Northwest. For the next century, the commercial oyster story was one of discovery, overharvesting, and a constant need to import brood stock from other parts of the world to restock oyster beds. It took almost another century for scientists, including those from OSU, to develop a successful hatchery program that gave hope for a sustainable commercial oyster industry. Oyster research has developed to address four primary problems: (1) replenishing oyster brood and improving genetics, (2) identifying and managing predators, (3) improving water quality, and (4) predicting and protecting consumers against harmful effects of algal and bacterial blooms that can make oysters toxic to humans.

[1] Gwil Evans edited this report and provided many useful ideas that increased the report's clarity. Numerous scientists and Mr. Xin Liu, Oregon Oyster Farms, Inc. gave freely of their time for interviews and offered very helpful suggestions.

[2] Gordon, David G.; Blanton, Nancy E.; and Nosho, Terry Y.; *Heaven on the half shell: the story of the Northwest's love affair with the oyster;* Washington Sea Grant Program, 2001.

Difficulties in raising oyster larvae have been exacerbated in the past five years. While the ocean's absorption of a portion of carbon dioxide emissions is beneficial in reducing a greenhouse gas, the ocean is becoming more acidic and the normal upwelling of ocean currents is distributing this more acidic water to oysters.

Specifically, "the ocean's daily uptake of 22 million metric tons of CO_2 has a sizable impact on its chemistry and biology...The reaction of CO_2 with seawater reduces the availability of carbonate ions that are necessary for calcium carbonate ($CaCO_3$) skeleton and shell formation for marine organisms such as corals, marine plankton, and shellfish."[3] Both hatchery production of seed ("eyed" larvae) and natural sources of "wild" seed have been impacted by these coastal upwelling effects.

Economic profile

Oysters are a product that has a high potential to remain differentiated[4] and thereby retain the ability to generate profits for producers. Demand for oysters does not seem to be income elastic or vulnerable to economic shocks like those associated with the recent recession: prices have not declined over the past two years. This may be due to the unique attributes of the product and/or excess demand that has persisted in the market over a long period of time. Oyster producers and customers tend to build strong relationships or develop a consumer loyalty that reduces the industry's marketing costs and cushions it through economic downturns. Serious challenges to the oyster industry and the constant innovation that is required to farm oysters successfully are reasons oysters have not become a commodity that is standardized and produced in high volumes with minimal risk and minimal profit.

Oregon oyster farmers produce about $4.7 million in oyster sales annually. For the past 10 years, there has been significant excess demand, probably sufficient to support more than double the current production. A tragic 2010 oil spill in the Gulf of Mexico expanded consumer awareness of and intensified demand for Oregon oysters. However, growth of the industry in response to this demand is limited by technical challenges inherent in solving the problems noted above.

Labor supply is not a limiting factor for oyster farmers. Most oyster farmers seek employees with a high school education, then provide on-the-job training. Oregon's most serious challenge economically is developing jobs for semi-skilled workers. The labor-intensive oyster industry provides an opportunity for semi-skilled workers to find year-round employment at levels of pay above minimum wage.

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[3] Feely, Richard A., Christopher L. Sabine, J. Martin Hernandez-Ayon, Debby Ianson, Burke Hales 2008. *Evidence for Upwelling of Corrosive "Acidified" Water onto the Continental Shelf.* Science 13 June 2008: Vol. 320. no. 5882, pp. 1490 – 1492.

[4] Oregon oysters have attributes (e.g. taste, consistency and size) that can distinguish them from oysters produced elsewhere. These attributes are due to the environment in which they are grown and the ingenuity of the Oregon oyster farmers and the scientists that support them.

Economic linkages and effects

The budget for OSU's oyster research program through the Oregon Agricultural Experiment Station is just under $700,000 annually, allocated between work at the OSU Hatfield Marine Science Center (HMSC) in Newport ($400,000) and at the OSU Seafood Laboratory in Astoria ($278,000). Funding for these programs is about 60 percent from out-of-state grants and contracts and 40 percent from state funding. External funding is about evenly split between special research grants and competitive grants and industry awards. Using the *IM*pact *PLAN*ning (IMPLAN) modeling system we estimated the economic effects of these research expenditures. Table 1 summarizes direct research expenditures made from research programs at HMSC and the OSU Seafood Laboratory, the indirect effects or spending with suppliers, and the induced effects of OSU scientists spending their incomes within their communities. The direct, indirect, and induced effects are expressed in four ways: (1) output, funding received, (2) employment, in both full- and part-time jobs, (3) labor income, and (4) total value added to the product which includes labor income, proprietor income, property income (leases and rentals), and indirect business taxes.

Table 1. Economic effects of oyster research expenditures

Research Expenditures Impact Type	*Output*	*Employment Full & Part-time*	*Labor Income*	*Total Value Added*
Direct Effect	678,000	10	372,863	330,531
Indirect Effect	335,039	4	114,195	183,353
Induced Effect	426,400	6	135,039	244,506
Total Effect	$1,439,439	20	$622,097	$758,390

The Pacific Coast Shellfish Growers Association reports that the Oregon oyster industry produces about 6.29 million pounds of oyster meat each year and sells it for $4.71 million. Table 2 provides the estimated effects of those sales for producers and the respending in the Oregon economy that the sales of oysters bring about. Businesses in Oregon can be grouped into general categories or industry sectors (e.g. dairy cattle & milk production, construction – new residential and retail stores – food and beverage). We traced the economic effects of Oregon's oyster industry through the IMPLAN model's sectors and found that the oyster industry's production affects 91 percent of the economic sectors in Oregon.

Table 2. Economic effects of oyster production

Industry Production by Impact Type	*Output*	*Employment Full & Part-time*	*Labor Income*	*Total Value Added*
Direct Effect	4,710,000	100	1,739,503	1,845,467
Indirect Effect	971,210	24	366,248	514,046
Induced Effect	1,835,446	25	581,442	1,052,426
Total Effect	$7,516,656	149	$2,687,193	$3,411,939

Approximately 30 percent of Oregon oyster sales are within Oregon and 70 percent outside Oregon. The economic effects in Table 2 may be multiplied by 70 percent to determine the dollars and jobs that could not be replaced if the oyster industry were severely disrupted (e.g. 149*.7=135). One of the state's major oyster farmers estimated that a disruption—or the end of oyster research by OSU—could have a 30 to 50 percent negative impact on his business. Production problems like toxic algae blooms and reduced hatchery success typically occur quickly. "There is always something Mother Nature is changing," he noted. OSU's program often is able to anticipate or address a problem in the current growing season. Without the OSU program, the time to solution would likely extend over one or more seasons, he observed.

Given the difficulties faced in all parts of the U.S. oyster industry and a persistent excess demand, it is reasonable to imagine that, with a few strategic investments, Oregon might encourage a significant increase in the oyster industry's production levels. Prior to the Gulf oil spill, 60 percent of United States production or approximately 226 million pounds of oysters were produced on the Gulf Coast.[5] Because Oregon production is now just 2.8 percent of that of the Gulf Coast and 1.7 percent of total United States production, this leaves a good deal of room for growth of the Oregon industry.

Considering the character of the production process for oysters, industry growth probably would not result in significant substitution of more capital-intensive (machine) techniques for operations that are currently labor-intensive. Economic effects of growing the industry from 1.7 percent of U.S. production to 5 percent of U.S. production may be estimated from Table 2 (5/1.7*7,516,656 = $22,107,812).

[5] Nickel-Kailing, Gail 2010. *Part 2: Shellfish Production in the Gulf of Mexico.* Food CEO The Business of Sustainable Food *(Online Magazine)*, June 1, 2010. http://foodceo.com/articles/2010/06/part-2-shellfish-production-in-the-gulf-of-mexico/

Contributions beyond the market

An adult oyster can filter 50 to 60 gallons of water per day. Therefore, Oregon's millions of oysters filter billions of gallons of water annually. To some degree, the value of this treated water may be inferred from what people have paid to gain such ecological services from oysters. In Chesapeake Bay, a number of oyster restoration projects are underway both to support the shellfish industry and to obtain the oysters' water-filtering capabilities. The water-filtering benefits of oysters are seen to mitigate effects of pollutants that reach the bay from municipal, agricultural, and other sources.

The U.S. Army Corps of Engineers and the State of Maryland are in the thirteenth year of a project to increase the native oyster population tenfold. The cost of that project will be at least $66 million. A recent Federal Executive Order directs the EPA and NOAA to increase efforts to protect and restore the Chesapeake Watershed "dedicating unprecedented resources" to the project. The administrator of the National Oceanic and Atmospheric Administration underscored the services that oysters can bring to an ecosystem. "Oysters are a key species for Chesapeake Bay restoration. Not only are they important to seafood lovers, but they cleanse water and form reef habitat," said Dr. Jane Lubchenco, NOAA administrator, and undersecretary of Commerce for Oceans and Atmosphere. "It is critical that we apply our best science toward native oyster restoration and habitat protection, as well as toward development of sustainable aquaculture. Ecosystem-based approaches to management will enable progress toward a healthy, sustainable Chesapeake ecosystem that will include oysters for generations to come," she said.[6]

Options to enhance economic contributions of oyster production

Oyster farming is unusually capable of employing semi-skilled workers, producing a differentiated product, and selling the product at premium prices that remain stable despite market fluctuations. In addition to economic development opportunities, oysters provide ecological services that are difficult to replicate otherwise and that increase the environmental capacity for other industries like agriculture.

This is a critical time for the oyster industry in Oregon. Just when the industry has an unprecedented opportunity to expand production, the OSU oyster research program continues to face declining resources.

[6] Chesapeake Bay Program Office 2010. *New Federal Strategy for Chesapeake Launches Major Initiatives and Holds Government Accountable for Progress (website article on May 12, 2010 ceremonies to release the Executive Order).* http://executiveorder.chesapeakebay.net/default.aspx

There are three relatively modest investments that could move the Oregon oyster industry to a higher market share. They include:

- Establish an OSU Extension Service seafood specialist position for Oregon focused on oyster production. Responsibilities of this educator would include providing and regularly updating a water quality tracking system, and assessing and helping to mitigate public concerns about oyster farms in estuaries.

- Organize a multi-agency partnership to respond quickly and minimize losses to the oyster industry when food safety concerns arise. This effort could be organized by the Extension seafood specialist collaborating with the producers, scientists and other stakeholders. The resources for this effort would be primarily for expenses like website development and travel.

- Intensify and supplement the current scientific studies that are searching for ways to mitigate the effects of ocean upwelling. This additional funding could be of limited duration presuming a three or five year effort could make significant advances in how to address the more acidic environment in the ocean.

The funds required for these investments may be $250-$500,000 annually. If they could provide critical assistance in adding one more percentage of market share to the Oregon oyster industry, each percentage point that is added would contribute $3,411,939 (current value added income)/1.7%(current U.S. market share) = $2,007,022 in value-added income to Oregon's economy. If the funding required was the highest amount estimated above, the leverage of the additional dollars would be $2,007,022/$500,000≈4:1. These additional resources could help a natural-resource-based industry realize a potential contribution to Oregon's economy toward which it has struggled for 150 years.

Questions?

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