Summary Report

Humboldt Bay Shellfish Mariculture Business Survey:

Assessing economic conditions and impact

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EXECUTIVE SUMMARY

The shellfish mariculture industry in Humboldt Bay has been growing in prominence in terms of seafood production in the region. Despite the industry's importance, there is little reliable data available about its baseline socioeconomic conditions. To gain more accurate information about the economic dimensions of the Humboldt Bay mariculture industry, we conducted a business survey of all six businesses operating in the Bay. The 23-question survey covered topics including employment, tidelands, facilities and equipment, expenditures, production, revenue, marketing, collaboration, and the industry's future. Surveys were administered in the summer of 2017 and questions focused on operations in the most recent year: 2016. Results indicate that the mariculture industry is an important contributor to the region's economy. Key economic statistics for the industry in 2016 include:

Businesses	6
Acres Under Cultivation	386
Jobs	101
Payroll	$3.01 million
Revenue	$9.8 million
Economic Impact (multiplier effect)	$19.3 million

Sixty-two percent of the industry revenue comes from the sale of whole Kumamoto oysters, 3% from the sale of whole Pacific oysters, and 34% from the sale of seed and larvae. When looking at the aggregate data, the industry appeared to be running at a slight loss in 2016. Total sales were $9.8 million and total expenditures $10.2 million. This may partly be the result of accounting practices of operations in Humboldt Bay that are part of larger companies that operate in multiple regions and by the fact that a few companies have recently made significant investments in seed and larvae production operations but those facilities were not yet running at capacity. In addition, expenditures can vary depending on where companies are in their permitting cycle. Seed was by far the largest expenditure accounting for 41% of the total.

Businesses were also asked to project future change in their businesses five years out (2022). Their responses indicate that they expect acreage under production, number of jobs, expenditures, production, and revenue all to increase in the coming years. Much of this projected increase is linked to the approval of the Humboldt Bay Harbor District's pre-permitting project, which could open up more grounds for mature shellfish production. These responses highlight the potential economic benefits of that project. Seed and larvae production was also anticipated to increase substantially. Local hatchery, seed-setting, and nursery activities are anticipated to ramp up in coming years. Businesses noted that there have been shortages of shellfish seed and larvae industry-wide. Increased seed and larvae production in Humboldt Bay could offer more security to the local industry, reduce operating expenditures, and be an important source of revenue for businesses going forward. The top ranked concerns for businesses moving forward included tideland availability, permitting costs, water quality, and regulatory changes.

1.0 INTRODUCTION

Historically and in the present, the seafood industry has been a central component of Humboldt County's social, economic, and cultural fabric (Pomeroy et al. 2010). Over the past few decades, the commercial fishing industry in Humboldt County has experienced significant declines related to various regulatory, economic, and demographic factors (Pomeroy et al. 2010). At the same time, the mariculture industry in Humboldt Bay has been growing in prominence in terms of seafood production in the region. In 2009, Humboldt Bay was named the Oyster Capital of California by the state legislature and it was estimated that over 70% of California's oysters are produced in Humboldt Bay (HBHD 2011). According to data provided by the California Department of Fish and Wildlife (CDFW), total revenues for the shellfish mariculture industry in California in 2016 amounted $15.8 million. The two largest regions for mariculture production are Humboldt Bay and Tomales Bay, with Humboldt Bay accounting for roughly $10 million of total revenue.

Despite the significance of this industry, there has been relatively little research investigating its socioeconomic dimensions and considering what factors or conditions may be essential for its long-term sustainability. In 2013, the Pacific Shellfish Institute released a report on the economic impact of the shellfish industry in California, Washington, and Oregon. The report estimated that in 2010, California accounted for $25.9 million or about 20% of the revenue on the West Coast. However, the report did not break down the findings to a regional or Bay level. Understanding the economic conditions of the mariculture industry in Humboldt Bay, specifically, can be important for long-range planning for the industry in the region.

In the early 2010's members of the mariculture industry and the Humboldt Bay Harbor, Recreation, and Conservation District (Harbor District) worked together to develop their own estimates of the industry's economics. The Harbor District reported that at the time the industry accounted for $6 million in sales and 56 jobs (Wilson, 2015). These statistics were loose estimates and the industry has undergone substantial changes in recent years; this highlights the importance of obtaining rigorous, accurate, and more current data about the local industry. CDFW has started collecting data on revenue from shellfish mariculture in the state. However, this data collection effort is relatively new and accurate data in this industry is notoriously difficult to acquire for a multitude of reasons. Additionally, the CDFW data does not maintain production and sales data for seed and larvae production in the region, which is a growing component of the industry in Humboldt Bay. To gain more accurate information about the economic dimensions of the Humboldt Bay mariculture industry, we conducted a business survey with all six businesses operating in the Bay. With this data we can better understand this important industry, highlight potential opportunities and also potential threats that the industry may face going forward.

2.0 STUDY SITE AND BACKGROUND INFORMATION

Humboldt Bay is located in northern California. With an area of 24.1 square miles at mean high tide, it is the second largest coastal estuary in the state (California Department of Health

Services, 2007). Shellfish production has been a part of Humboldt Bay since time immemorial as the Wiyot people were known to harvest and consume shellfish in the bay (Walters, 2012). Commercial shellfish sales in the bay dates back to 1854 when L.K. Wood began selling clams gathered from the bay. The first documented attempt to grow oysters in the bay was in 1897 (Coy, 1975). Currently mariculture production in Humboldt Bay includes four species: Kumamoto oysters (*Crassostrea sikamea*), Pacific oysters (*C. gigas*) and to a lesser degree Manila clams (*Tapes philippinarum*) and mussels (*Mytilus galloprovincialis*) (HBHD 2015). There are currently six different businesses operating in the Humboldt Bay shellfish mariculture sector. Maps of the locations of leased tidelands for these businesses can be found in Figures 1 and 2.

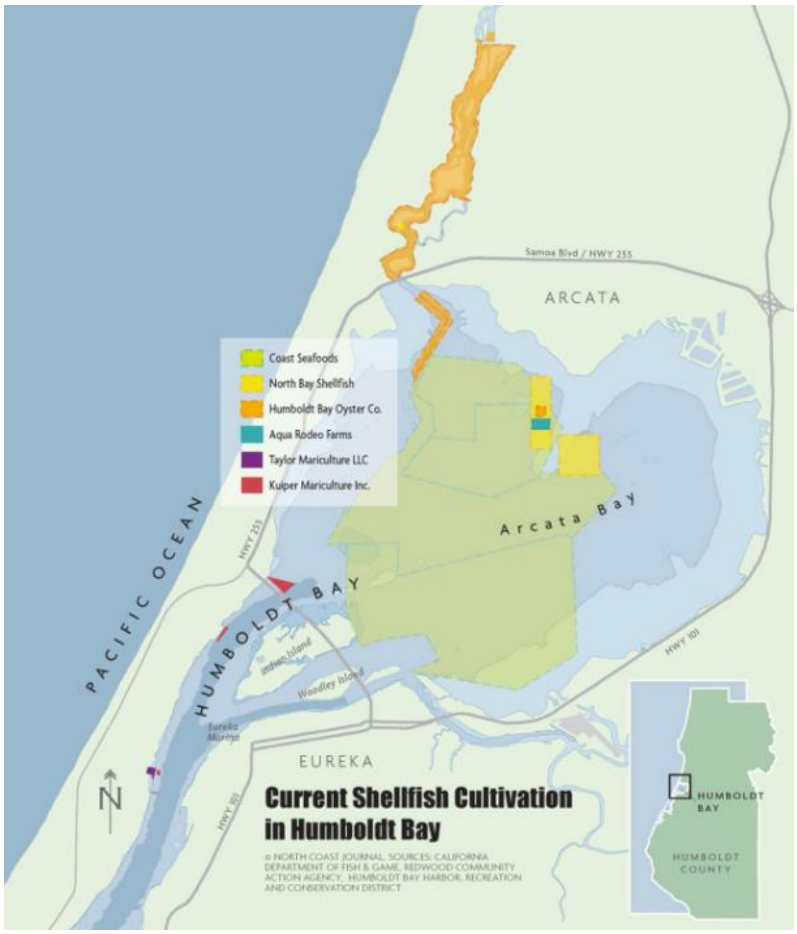


Figure 1. Map of Humboldt Bay Shellfish production areas as of 2012. The colored areas represent lease blocks and not all colored acres are under cultivation. Kuiper Mariculture Inc. was purchased by other businesses operating in the Bay (Source: Walters 2012).

Figure 2. Recently approved sub-tidal areas that are nursery sites for seed production. Currently Hog Island Oyster Company and Taylor Shellfish utilize these sites (Source: HBHD 2015)

The six businesses that operate on Humboldt Bay represent a variety of business models, which are linked to different phases in shellfish production. Generally, the process of shellfish production as it is conducted in Humboldt Bay can be broken down into four broad phases.

(1) First shellfish larvae must be produced in **hatcheries**. Hatchery staff spawn broodstock to produce larval offspring. The larvae are cared for, with a diet of hatchery-produced phytoplankton, until they reach the "eyed" stage (Merritt and Wilson, N.D.).
(2) Next the free-floating larvae go through a process of **setting**. A cultch material, generally finely-ground oyster shell, is added to the tank and the larvae begin the process of setting on a piece of substrate. The setting process can happen in a hatchery or in a separate seed-setting facility where larvae are shipped in from other locations to be set. The set seed or spat is generally fed and cared for in the hatchery or seed-setting facility until it reaches about 2,000 microns (2mm) in size.
(3) The set seed (or spat) is then moved outdoors into bay water where it is grown in a **nursery** system to increase in size and become ready for final production. Typically, the oyster seed is placed in what are called floating upwelling systems (FLUPSYs). These floating bins contain beds of oyster seed and utilize an electric motor to continually draw water through the beds so oyster spat can grow while feeding on naturally occurring phytoplankton. After a period of time on the FLUPSYs, the seed may be moved to additional nursery facilities in the bay to facilitate further growth.
(4) The final stage of the production involves final **grow-out** or market shellfish production. Here the mature seed is placed in plastic mesh bags or baskets at a very low density and suspended in some manner, either by "rack and bag" or "basket on long line" methods –

the grow-out approach can vary by business. Over the course of 1-2 years the seed will grow to full size and the shellfish will be harvested for sale.

The product of each of these phases of production can be an important source of revenue for mariculture businesses (Table 1).

Table 1. Broad Sources of Revenue in the Humboldt Bay Shellfish Mariculture Industry

Source:	Species in HB:	Description:
Larvae	None: working on Kumamoto and Pacific oyster	Free-floating larvae produced in a true hatchery by spawning brood stock. Larvae can be sold to other companies or kept in the same facility for setting and grow-out.
Spat (seed that has been set)	Kumamoto oyster (with plans for Pacific oyster)	Spat is produced by setting free-floating larvae onto cultch material – generally finely ground up oyster shell. Recently set seed can be sold or moved to another phase of production when it has reached a size of about 2,000 microns (2mm). Spat is shipped to other oyster producers in California or on the West Coast. Seed shortages have been reported throughout the West Coast so this can be an important source of revenue. Spat can be sold to other companies or used by a business for their own production. Businesses without a hatchery can produce their own spat by obtaining larvae from other facilities and setting it in their own facility.
FLUPSY Seed/Spat	Kumamoto oyster, Pacific oyster, Manila clam	Seed that has been grown out to at least some degree in a nursey or FLUPSY system. In many cases, the FLUPSY seed is ready to be moved into the final grow-out stage of mariculture production. Businesses that have a hatchery and FLUPSY system can sell larvae, spat, or FLUPSY seed. Businesses without a hatchery or seed-setting facility can still buy spat, grow it out in a FLUPSY, and then sell FLUPSY seed to other businesses as a source of revenue. FLUPSY seed can be sold to other companies or used by the same business for their own production.
Market Shellfish	Kumamoto oyster, Pacific oyster, mussels	The final product typically associated with mariculture production – market shellfish. Currently there is a very small amount of mussel production and no production of market clams in Humboldt Bay. Market shellfish can be sold to local restaurants and markets or to dealers and shipped out of the area.

A broad overview of the industry in the bay based on publicly available information (and not results from this survey) shows that not all of the businesses in Humboldt Bay participate in all four phases of shellfish production. Table 2 shows the different parts of the industry that each business on the bay is involved in. There is only one true hatchery on Humboldt Bay that is capable of producing larvae, opened by the Hog Island Oyster Company in 2017. This is also the first hatchery in Northern California. While Hog Island's facility is currently setting seed, it has not yet spawned broodstock to produce shellfish larvae. It will likely begin larvae production in 2019. Taylor Shellfish has a seed-setting facility where they produce hatchery seed but their larvae are shipped in from hatcheries outside of the state so technically their facility is not considered a hatchery. Five businesses on the bay operate FLUPSYs to produce FLUPSY seed. Only four of the six businesses are involved in final grow-out or market production of oysters in the bay. Three of the six operators in Humboldt Bay are connected to larger businesses that are involved in mariculture production in other areas. The other three businesses are completely local so all of their production and business operations are in Humboldt Bay. It is possible that there could be a seventh mariculture entity active on the bay in the near future, as there is currently one applicant, known as Yeung Oyster Company that is attempting to permit shellfish culture in Humboldt Bay (HBHD 2017).

Table 2. Mariculture businesses operating in Humboldt Bay and the phases of mariculture production in which they are involved in Humboldt Bay. Based on publicly available information and not survey results.

Business:	Hatchery:	Seed-setting:	FLUPSY:	Market Production:	Operations outside HB?:
North Bay Shellfish				X	
Aqua-Rodeo Farms			X	X	
Humboldt Bay Oyster			X	X	
Coast Seafoods			X	X	X
Taylor Mariculture		X	X		X
Hog Island Oyster Co.	X	X	X		X

3.0 METHODS:

The research team developed a 23-question survey instrument to administer to each of the mariculture businesses operating on Humboldt Bay (Appendix I). We used the survey instrument developed by Northern Economics, Inc. (2013) in their assessment of mariculture activities throughout the West coast as a starting point and added questions relevant to mariculture activities in the Humboldt Bay region. Questions covered topics including employment, tidelands, facilities and equipment, expenditures, production, revenue, marketing, collaboration, and the industry's future. Questions focused on operations for the most recent year: 2016. An early version of the survey instrument was provided to representatives of the mariculture industry for review. We used feedback from the

representatives to revise the survey so that questions better reflected the realities of the mariculture industry.

The surveys were given to representatives from each of the six businesses operating in the bay. Businesses were able to take their time to fill out the instrument and the research team was available to answer any questions that participants had. All of the six businesses participated in the study and returned completed survey; however not all participants answered every question. In some cases, the research team followed-up with participants where answers were unclear and to ensure the accuracy of the data.

Economic data about the realities of a business is very sensitive and several steps were taken to ensure confidentiality in the data that we collected. The data collection and analysis process followed the HSU Institutional Review Board (IRB) protocol 15-052. All results from the survey are presented in aggregate form and we followed the "rule of three" common in analyses with fisheries datasets. Under the rule, we will not present aggregate findings if they include data from fewer than three businesses. This way the results cannot be used to uncover production or sales data from one specific business. In the results section, we denote any questions that fewer than three businesses answered with a dash and do not include an aggregate number. The goal of the study is not to describe individual mariculture businesses but to describe the conditions of the industry as a whole.

4.0 RESULTS:

4.1 Employment

According to survey results, in 2016 there were 98 full-time employees and 3 part-time employees working in the mariculture industry in Humboldt Bay area (Table 3). Total expenditure for payroll in 2016 was $3,014,366 (see: Table 8).

Table 3. Employment data for the Humboldt Bay mariculture industry in 2016. Based on responses from all six businesses.

	#
Humboldt Bay Region Full-time Employees	98
Humboldt Bay Region Part-time Employees	3
Total Humboldt Bay	101

The mariculture operations include a variety of employee types (Table 4). In the survey businesses were asked to place each employee into the one role that best describes their position– even if they perform multiple duties. The most common type of employee in the industry is laborers or farm hands, followed by managers and supervisors. The businesses did not indicate any employees who specifically worked in sales or in delivery. This could mean those functions are covered by employees with other roles or that, in the case of larger businesses, those functions are performed by employees based outside of Humboldt County.

Table 4. Number of employees of different type involved in the mariculture industry in the Humboldt Bay region. This data is based on responses from all six businesses.

Employment Type:	Number:
Owner/Operators	4
Managers/ Supervisors	14
Laborers/Farm Hands	79
Marketing/Sales	0
Maintenance/Safety	3
Delivery	0
Other	1
TOTAL	101

4.2 Tidelands

In 2016 participants of the Humboldt Bay shellfish mariculture industry reported that they were collectively in control of 4,045 acres of Humboldt Bay, however only 386 acres of this area is under cultivation (Table 5). When asked to explain the difference between the acres under control and the acres under production, respondents said that many of their acres are not suitable for shellfish production. Additionally, permitting requirements and the presence of eelgrass have limited the number of acres under production in the bay. Keep in mind that Humboldt Bay is about 16,000 acres in size.

Table 5. Area of tidelands under control and under cultivation in 2016. Based on responses from all six businesses.

	Acres
Acres Under Control 2016	4045
Acres in Cultivation 2016	386

4.3 Facilities and Equipment

In 2016 participants of the Humboldt Bay shellfish mariculture industry reported that in relation to their Humboldt Bay operations they owned or leased 15 land-based structures, totaling 77,300 square feet. Businesses indicated substantial investment in equipment related to mariculture operations. Table 6 shows the number of different types of equipment owned across all businesses. The six mariculture entities reported that they collectively have 5,054 square feet of cold storage space. When asked if their operation had sufficient cold storage space, 3 of the 6 companies said no and these three operators cumulatively would prefer an additional 2,200 square feet of cold storage (Table 7).

Table 6. Equipment owned by Humboldt Bay mariculture businesses in 2016. Based on responses from six businesses.

Equipment Type:	Number:
Facilities/Buildings	15
Boats/Vessels	18
FLUPSYs	13
Land-based upwellers/downwellers	18
Tumblers/Sorters	15

Table 7. Square footage of facilities overall and of cold storage specifically. This data is based on responses from five businesses.

	Square Footage:
Overall facilities	77,300
Cold storage current	5,054
Additional cold storage desired	2,200

The businesses were asked about the extent to which they lend and borrow equipment with other mariculture businesses on the bay. Results indicate that lending of equipment does occur to some degree within the industry. Five businesses reported that they lend equipment to other mariculture operators at least once a year.

4.4 Expenditures and Seed

Table 8 contains a tally of the expenditures occurred by mariculture businesses in Humboldt Bay in 2016. Overall businesses reported $10.2 million in expenditures in 2016. The largest single source of expenditure for the industry is seed, amounting to 41.9 percent of total expenditure. This was followed by labor expenditures at 29.3 percent. Capital expenditures, which is not necessarily an operating expenditure, appeared to be the second or third highest expense although only five businesses provided a response. Other expenditures included federal and state taxes, licensing fees, leasing facilities and mortgages, and other operating expenses such as ice, gas, utilities, freight, and maintenance. In table 8, capital expenditure is excluded from calculating the percentages of total expenditures because percentages are calculated only according to operating expenses.

When asked, five of the six businesses responded that access to seed was a primary challenge for their business. All respondents indicated that there was limited availability of seed. In 2016, survey respondents stated that seed and larvae was purchased from Washington, Oregon, California, Hawaii, and Alaska.

Table 8. Total expenditures of different categories incurred in 2016 by businesses operating in Humboldt Bay. All expenditures are related to Humboldt Bay operations, even for businesses that have components in other locations. Not all businesses responded with information for every type of expenditure. Expenditure amounts for those with fewer than three businesses reporting are left blank. For expenditure categories where all six businesses responded, a percentage of the total expenditures is calculated.

Expenditure Type:	2016 Expenditures:	% of Total Expenditures:	# of businesses reporting
Payroll	$3,014,366	29.29%	6
Non-wage Benefits	$280,347	2.74%	6
Federal Taxes	$125,655	---	3
State Taxes	---	---	2
Permitting Fees	$32,992	---	4
Lab Monitoring Fees	$22,520	---	4
Health Compliance Fees	---	---	2
Facility Leases and Mortgage Fees	$381,882	3.73%	6
Capital Expenditures (not including debt service)	$2,310,866	---	5
Seed and Larvae	$4,289,767	41.88%	6
Repairs and Maintenance	$529,139	5.17%	6
Insurance	$281,448	2.75%	6
Ice	$42,898	---	4
Freight	$201,883	---	3
Gas and Fuel	$88,828	0.87%	6
Utilities	$217,642	2.12%	6
Total Expenditures*	$10,243,878	100.00%	6

* The figure for total expenditures is more than the sum of all shown values because it includes data for those categories with fewer than 3 businesses.

4.5 Production, Revenue, and Markets

The Humboldt Bay mariculture industry generates the majority of its revenue through the sales of whole oysters (65%). The largest source of revenue for the industry is whole Kumamoto oysters accounting for 62% of total revenues. Whole Pacific oyster revenue amounted to 3%

percent of total revenue for the industry. Sales of seed and larvae are also large revenue sources accounting for 34% of total revenue (Table 9).

Table 9. Shellfish production and sales data for the Humboldt Bay mariculture industry in 2016 data based on responses from all six businesses. Cells where fewer than three businesses reported sales or production are marked with a dash.

Shellfish Type:	**Production**		**Sales**	
	#	%	$	%
Pacific Oysters (Market Size)	656,562		$342,276	3.48
Kumamoto Oysters (Market Size)	9,299,170		$6,114,231	62.2
Mussels	---	---	---	---
Market Size Shellfish Total	9,955,732		$6,456,507	65.7
Seed and Larvae Total	--		$3,373,271	34.3
TOTAL			$9,829,778	

Based on data reported from all six businesses, in 2016, Humboldt Bay produced nearly 10 million market-sized oysters. Not all businesses responded to questions related to seed production, but statistics from the three or greater businesses who did respond indicate that in 2016 Humboldt Bay produced at least -- and likely much more than -- 180 million units of oyster and clam seed and larvae.

When asked what percentage of their business revenue comes from shellfish and seed sales all six companies reported that 95% or more of their revenue is related to shellfish sales. Other sources of revenue included subleasing grounds and offering tours. Three of the companies operating on the bay reported that their business was connected to or operated a restaurant that sold shellfish they produce. Additionally three businesses reported that they sell merchandise related to their business.

Operators were asked what percentage of their overall company's revenue comes from the Humboldt Bay region. Three companies are entirely local and responded that 100% of their revenue comes from the region. The three other businesses all reported that the Humboldt Bay region accounts for a relatively small percentage of their total company income (less than 12% for each business).

Businesses were asked how they used or sold the seed and larvae that they produce on Humboldt Bay (Table 10). More than half (53%) of seed produced in Humboldt Bay is used by the same company that produces it. Some companies may account for the use of seed within other parts of their own business as sales, while other companies do not consider the use of

seed within their own business as a form of sales or revenue. Therefore, the sales figure for seed and larvae is likely an underestimate of the total value of seed that the bay produces.

Table 10. Percentage of Humboldt Bay produced seed and larvae that is allocated to different uses. Based on responses from all six businesses.

	%
Same Company Operations in Humboldt Bay	1
Same Company Operations outside Humboldt Bay	53
Different Company	46

Companies were asked several questions about the types of venues and locations where they sell their market shellfish (Tables 11 a,b). Three businesses responded to the question. Their responses show that restaurants and retail outlets are the most common buyers of their shellfish. However, substantial portions of their sales are direct to customers and wholesalers. Four percent of their sales occur at a one-day event: Arcata Oysterfest. The majority of market shellfish produced by these companies is sold within Humboldt County (79%) and none of the businesses sold any oysters outside the United States, or even outside of California. It is important to note that these data come from responses from some of the smaller businesses operating in Humboldt Bay. Anecdotal information indicates that there is at least one business in Humboldt Bay that exports substantial portions of their shellfish out of the area and out of the state.

Table 11. (a) The percentage of market shellfish that Humboldt Bay operators sell to various outlet types; (b) The percentage of market shellfish that operators sell to various locations or regions. These percentages are based on responses from three of the four businesses that produce market shellfish in Humboldt Bay.

a. Venue of Sales:	%
Restaurants	42
Retail Outlets	32
Wholesalers	6
Direct to Customers	16
Arcata Oysterfest	4

b. Location of Sales:	%
Humboldt County	79
California (not Humboldt county)	21
Outside California	0
Outside United State	0

Some businesses operating on the Bay have third party certification or eco-labeling associated with their shellfish production activities. Certifications possessed by businesses operating in the Bay include Food Alliance, B Corp, and ASC.

4.8 Collaborations/Community Work

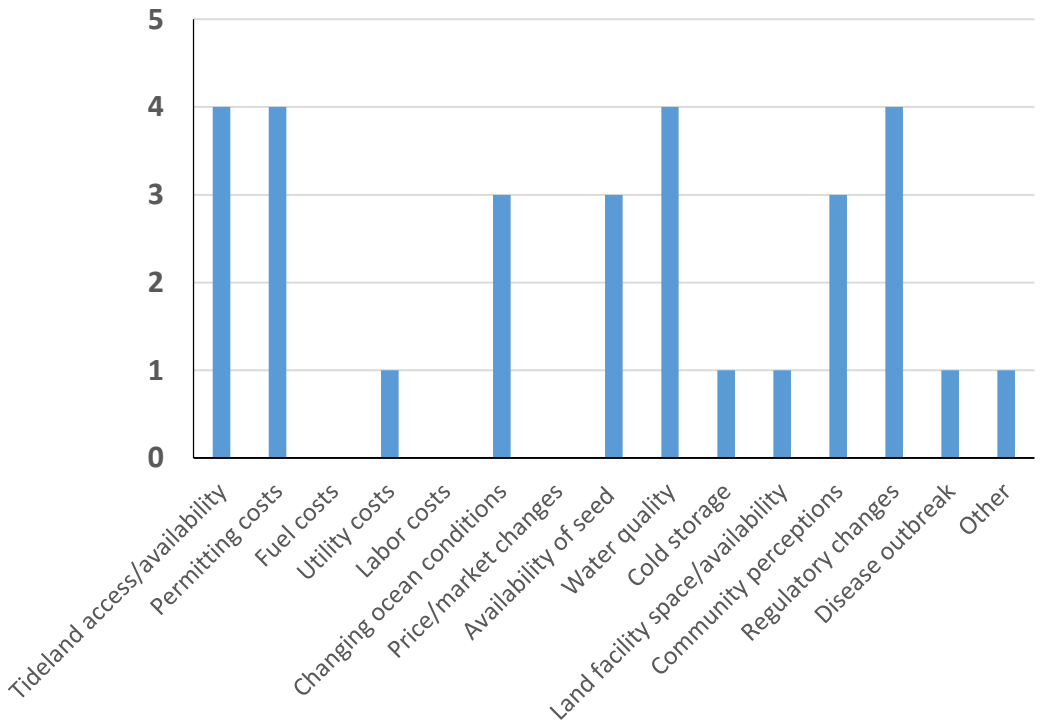
Responses to the survey indicated that the mariculture industry is active in the community. Based on responses from five of the six businesses, collectively the industry spends 267

employee hours a month collaborating or engaging with the community. This includes involvement in permitting processes for businesses other than their own, involvement in graduate student research projects, Humboldt State University activities, water quality studies, eelgrass and black brant studies, shellfish growth and safety studies, high school activities, agriculture extension projects, Adopt a Highway, Adopt a Bay, beach clean-ups, and farm-to-table initiatives in the community. Survey results indicated that, in general, the six businesses on the bay work well together and are supportive of each other.

4.9 Concerns for the Future

Each business was asked to rank their top five concerns for the future of the mariculture industry based on a list of 14 possible concerns. They were also given the option to add another possible concern or threat. Cumulatively respondents only marked 11 of the threats (along with other) as being within their top five concerns. Figure 3 shows the number of businesses that selected each concern within their top five. Top concerns included tideland availability (or access to grow-out grounds), permitting costs, water quality, and regulatory changes. Changing ocean conditions, availability of seed, and community perceptions were also ranked as key concerns. None of the respondents marked fuel costs, labor costs, or price/market changes as being within their top five concerns. The respondent who selected other asked that "politics" be added as a concern that the industry faces.

Figure 3. Perceived industry threats: number of businesses that listed each concern as one of their top five concerns for the future of the mariculture industry in Humboldt Bay



4.10 Projections for 2022

For most of the categories on the survey we asked businesses to project how they believed that category would change for their company over the course of the next five years (in 2022). Table 11 shows a summary of projections for the different categories. Not all businesses replied with precise estimates, some simply stated whether they believed categories would increase or decline. In cases when a business did not reply with a specific number, we kept the same value from 2016. As a result, these are to be considered underestimates of the total change that businesses plan to experience. Businesses also included narrative comments about why they believed certain aspects of their business would change in the next five years.

Table 12. Humboldt Bay mariculture business projections of change from 2016 to 2022.

	2016	2022 Projections	% Change	# responded
# of employees	101	149	+ 47.52%	5
Acres Under Cultivation	386	518	+ 34.20%	5
Expenditures	$10,243,878	$11,643,878	+ 13.67%	2

4.10.1 Employment Projections

According to company estimates, employment is projected to increase in Humboldt Bay by 48% in 2022. Companies indicated that the potential for additional employment is “closely tied to pre-permitting project completion”. The Harbor District is working on pre-permitting acreage in Humboldt Bay for mature oyster grow-out (HBHD 2015). If this project is approved, several companies operating in the bay will be able to expand their operations and as a result will need more employees. Expansion of seed and larvae production could also lead to an increase in employment.

4.10.2 Acreage Under Cultivation Projections

When asked to estimate future acreage of cultivation in Humboldt Bay, participants estimated 518 acres of Humboldt Bay in 2022. Some businesses estimated that the acreage that their business had under cultivation would increase in the next five years while others estimated that it would decrease. Those companies projecting an increase cited the potential pre-permitting project, which would open up acreage for projection. Companies also cited increasing market demand for oysters as a motivation behind possible expansion. Businesses that projected a decrease in acres under cultivation cited concerns over, “eelgrass encroachment on existing grounds.” Encroaching eelgrass could lead to permitting challenges for some of the current oyster grounds. Businesses also mentioned the possibility of setting aside some of the acreage currently under cultivation as mitigation into the future. While projections were mixed business to business, overall respondents predicted at 35% increase in acres under cultivation over the next five years.

4.10.3 Expenditures Projections

Not all businesses responded to questions related to projected expenditures in 2022. However, the few that did all cited that they believed their expenditures would increase over the course of the next five years. Projected increases in expenditures were linked to the need to purchase or upgrade equipment in the coming years and the possibility of expanding production if the mariculture pre-permitting project was approved.

4.10.4 Production and Revenue Projections

We did not ask businesses to project production or revenue into the future. However, survey responses can give some insights into the future potential of the industry on the bay.

In terms of mature shellfish production, several companies indicated that if grow-out grounds were to be permitted through the pre-permitting project (HBHD 2015) their mature shellfish production would increase dramatically. Pre-permitting might enable businesses that do not have any mature shellfish production in Humboldt Bay to begin producing shellfish as a part of the Humboldt Bay business model. Coast Seafoods' permit for operations was recently renewed. While they were directed to reduce their total acreage under production; they were approved to grow shellfish at higher densities which could ultimately end up increasing their shellfish production over the next five years.

Four of the six participants in the Humboldt Bay shellfish mariculture industry stated that they have plans to get into or increase shellfish seed and larvae production as a part of their business model. These respondents desired to increase their seed and larvae production because of the need for seed and the ability to stay relevant in the industry. In 2016, the one hatchery on Humboldt Bay was not yet producing larvae and most businesses that produce seed expressed a desire to increase seed production. Therefore, the bay is likely to see a large increase in seed and larvae production in the near future. Seed and larvae production provides tremendous potential for growth in the industry.

Several of the businesses responded that they might be interested in pursuing new types of mariculture in the future. Some companies hoped to add shellfish species that are being produced by other entities in the bay (but not by them) to their own business model. Respondents also expressed an interest in exploring seaweed and scallop production in Humboldt Bay.

5.0 ANALYSIS AND ECONOMIC IMPACT

5.1 Economic Impact

Data reveal that the mariculture industry is an important contributor to the economy of the Humboldt Bay region (Table 13). In 2016, the industry provided 101 direct jobs in the region and produced $9.8 million in direct value from sales of locally produced shellfish and shellfish

seed and larvae. Of the industry revenue for the bay, 62% comes from the sale of Kumamoto whole oysters, 3% from the sale of Pacific whole oysters, and 34% from the sale of seed and larvae. A small amount of additional revenue related to the Humboldt Bay mariculture industry comes from sale of other shellfish products (whole mussels), from sales of branded merchandise, and from hosting mariculture tours. When assessing total economic impacts of any industry the revenue from the industry only accounts for direct economic activity.

There are also indirect impacts for the economy of any region. For example, dollars spent by the industry on payroll generate economic activity in the region when these individuals spend their earnings in the local community. Thus, for every dollar of revenue earned, a multiple of that revenue is generated for the surrounding businesses. Typically, economists account for the indirect impacts of any given business through what are called multipliers. Development of a multiplier is beyond the scope of this study. Northern Economics Inc. (2013) conducted an input-output study of the mariculture industries of Washington, Oregon, and California. They were able to generate individual economic multipliers for Washington and California and our study will utilize the California multiplier generated in that study. The economic multiplier developed for California is 1.97 (Northern Economics Inc. 2003, p. 29). Thus, every dollar of economic activity in the industry is estimated to generate a total of $1.97 of total economic activity. The shellfish mariculture industry in Humboldt Bay is a multimillion-dollar industry with revenues of $9.8 million in 2016. We estimated that this in turn generated a total of $19.3 million of economic activity when accounting for the multiplier effect.

Table 13. Summary of the Economic Impact of the Mariculture Industry in the Humboldt Bay region

Jobs	101
Payroll	$3.01 million
Revenue	$9.8 million
Economic Impact (multiplier effect)	$19.3 million

When asked to project the state of their businesses five years out (2022), overall respondents expected that employment, acreage under production, expenditures, production, and sales would all increase. Many of these projected increases are connected to the Humboldt Bay Harbor District's pre-permitting project, which would pre-permit grounds for mature shellfish production and lease it to businesses operating in the bay. The project has not yet been approved, but if it does, the economic impact of the industry is likely to increase. Additionally, production and revenue from seed and larvae production is likely to increase substantially in the near future as hatcheries develop and businesses look to increase production. Seed and larvae production are not as constrained by permitting processes so growth in that sector may be able to proceed at a more rapid pace when compared to mature shellfish production.

The final projection for mariculture sales in 2016 – $9.8 million – was generated from our survey responses where all six businesses responded with information. It is important to note

that this number differs from the dollar value of shellfish sales provided by California Department of Fish and Wildlife. That data had sales revenues of $10,060,438. While this difference might appear insignificant, the CDFW data does not include seed and larvae sales. From our survey seed and larvae sales accounted for $3,373,271 of revenue in a $9.8 million industry. The CDFW estimated also includes substantial revenue from one company related to a species of shellfish that the company did not sell at all in 2016. When we contacted the company, they said the CDFW data must be incorrect.

Interestingly, when looking at the aggregate sales and expenditure data the industry as a whole is running at a slight loss. Total sales were $9.8 million and total expenditures $10.2 million. Two factors may help to explain this finding. First, some of the larger companies operating in Humboldt Bay also operate in other regions. In some cases seed that is produced in Humboldt Bay is exported to other areas for final grow-out. Depending on how each business does their accounting it would be possible for the cost of producing the seed to be reported for in the Humboldt Bay regional expenditures, whereas the final revenue from the sale of the market shellfish product to be recorded in a different region. This result also could be linked to the new and up-and-coming state of seed and larvae production on Humboldt Bay. Several facilities have recently moved into larvae or seed production on Humboldt Bay. This may have led to substantial upfront investment in infrastructure and facilities. At the same time, revenues may not have been that high as the facilities were not yet been producing seed and larvae at capacity. Additionally, revenue related to seed and larvae production on Humboldt Bay is likely to increase substantially in the coming years. Operators also reported that expenditures can vary year to year depending on the permitting cycle. In years when they have to renew permits businesses must pay a large amount in consulting and permit fees which may lead to a loss in that year. However, typically they should be able to make that loss up in non-permitting years.

5.2 Revenue Diversification

All of the companies reported that 95% or more of their Humboldt Bay region revenue comes from the sale of market oysters and seed. Companies reported additional revenue from merchandizing and offering farm tours. At least one company operating in the Humboldt Bay region owns restaurants for shellfish, but these restaurants are located outside the region. Tourism and merchandise could be a source of revenue growth and diversification in the future though the growth potential is probably small. None of the survey respondents participate in value added products like shucked and jarred oyster sales out of their Humboldt Bay facilities. Nor do any report sales of frozen oysters. The larger companies may conduct these operations in other regions/states. Lack of participation by smaller producers is possibly due to the lack of processing facilities or because inventory is more profitably allocated to other consumers. Investment in processing facilities could provide potential opportunities for revenue diversification and growth.

5.3 Seed

Survey results reveal that shellfish seed is a very important component of the mariculture industry in Humboldt Bay. Overall, seed represented the highest expenditure for the industry, amounting to 42% of total expenditures. Seed production is also emerging as an important source of revenue. In 2016, seed and larvae sales accounted for $3.4 million or 34% of total sales for the industry. Given the recent addition of hatchery and seed facilities in the area, that number is likely to increase in the future.

Cost and availability of seed was noted as a challenge by most participants in the survey and all respondents indicated that there was limited availability of seed. Therefore, production and access to seed is an important bottleneck for the industry. Investment in seed production to alleviate this bottleneck could provide important efficiency gains and risk/cost reduction for the industry. This fact is recognized by the producers in the region. Five businesses responded that they plan to get into or increase seed production in the next five years. The ability to produce or purchase seed and larvae is vital and potential seed shortages can pose a serious risk to the industry. Seed and larvae production also provides an important potential source of revenue growth for the industry into the future. Seed production is not subject to the same spatial limitations and permitting challenges as mature oyster production, so it may be poised for a more extensive expansion. However, in the survey, oyster operators also expressed a desire for more grow-out grounds. Operators reported that they are able to sell all the mature shellfish that they produce and space for mature grow-out is the most limiting factor in terms of future growth in mature shellfish sales. The approval of the pre-permitting project could also be a means to increase the production and economic output of the industry in the region.

6.0 ACKNOWLEDGEMENTS

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APPENDIX I: Survey Instrument

Begins on next page.

Please do not write your name of the name of your business on this questionnaire.

Please indicate that you have been made aware of the research process and your rights as a participant.

☐ By checking this box, I consent to the research process described in the letter included with this survey and acknowledge that I have been made aware of my rights as a participant in this survey.

SECTION A. EMPLOYMENT:

1.) Number of employees (where employees *live* and work)

	Humboldt Bay Region		Outside Region	
	Full Time	Part Time	Full Time	Part Time
2016				
5-years out (est.)				

2.) Number of different types of employees in Humboldt Bay region**:** one employee can only be on one category; select the most appropriate

a. Owner/Operators: # _____

b. Managers/ Supervisors: # _____

c. Laborers/Farm Hands: # _____

d. Marketing/Sales: # _____

e. Maintenance/Safety: # _____

f. Delivery: # _____

g. Other (list category) _____: # _____

h. Other (list category) _____: # _____

i. Other (list category) _____: # _____

j. Other (list category) _____: # _____

k. Other (list category) _____: # _____

Comments on employees and anticipated change in employment in the next 5 years:

_____
_____
_____

SECTION B. TIDELANDS:

3.) Tide Lands (grow out grounds) permitted for aquaculture and under your control

	2016 acres	Lease Rate: Dollars Per Acre Per Year you pay	Estimated number of acres-5-years out
Number of Acres in Humboldt Bay			
Number of Acres outside of Humboldt Bay			

4.) How many Humboldt Bay acres (grow out grounds) do you have control over that are not under cultivation?_____

5.) Does your company sublease acreage to another company in Humboldt Bay? Y / N

If yes, then how many acres does your company sublease and at what rate?

	2016	Lease Rate: Dollars Per Acre Per Year you charge
Number of Acres Subleased in Humboldt Bay		

Comments on tidelands and anticipated change over the next 5 years:

_____
_____
_____

SECTION C. FACILITIES AND EQUIPMENT: (Humboldt Bay ONLY)

6.) Number of building/facilities/structures in Humboldt Bay your operation owned or leased in 2016:

2016-Building/Facilities Owned or Leased	
#:	SqFt:

7.) Equipment in Humboldt Bay your operation owned in 2016:

a. # of boats/vessels your business owns: _____

b. # of FLUPSYs your business owns: _____

c. # of land-based upwellers/downwellers your business owns: _____

d. # of tumblers/sorters your business owns: _____

e. Estimated amount of cold storage space _____ sq. ft. (not including insulated totes)

8.) Do you feel that your business has sufficient cold storage? Y/N

If no, how much more cold storage space would you prefer to have? _____ sq. ft.

9.) About how often does your business borrow major equipment from other businesses on the bay?

Never Once a year Once a month Once a week Daily

10.) About how often does your business lend major equipment to other businesses on the bay?

Never Once a year Once a month Once a week Daily

Comments on facilities and equipment and anticipated change over the next 5 years:

_____

_____

_____

SECTION D. EXPENSES:

11.) Approximate Expenses for 2016 calendar year related to Humboldt Bay operations:

	2016	Est 5 yrs. out	
TOTAL EXPENSES	$		*Likely more than sum of categories below*
Labor Expenses			
Total payroll	$		
Total non-wage benefits	$		
Taxes			
Federal	$		
State & Local	$		
Environmental Monitoring/Permitting			
Permit fees	$		
Monitoring fees	$		
Health Compliance/Permitting			
Permit fees	$		
Compliance fees	$		
Other Expenses			
Facility leases/mortgage	$		
Capital expenditures (NOT debt services)	$		Includes gear purchases
Seed & shellfish	$		
Repair & Maintenance	$		
Ice	$		

Insurance carriers	$	
Freight	$	
Gas/Fuel	$	
Utilities	$	

Comment on expenses and also the extent to which you believe these will change in the next 5 years

_____
_____
_____
_____

SECTION E. PRODUCTION:

12.)Shellfish Production (Humboldt Bay ONLY). Please specify units for each category

	Total Volume	Fresh Whole	Shucked/ Jarred	Frozen	Other	Seed or Larvae
UNITS:						
Pacific Oysters						
Kumamoto Oysters						
Manila Clams						
Other 1:						
Other 2:						

13.)If you produce (or grow out) seed and larvae what percentage goes to these various outlets:

a. Use in your own company's operations in Humboldt Bay_____ %

b. Use in your own company's operations outside of Humboldt Bay_____%

c. Sold to other businesses/entities_____%

Comment the extent to which you believe these categories will change in the next 5 years and why:

_____
_____
_____

SECTION F. REVENUE:

14.) Shellfish sales revenue (Humboldt Bay ONLY)

	Gross Sales Value
Pacific Oysters (Market Size)	$
Kumamoto Oysters (Market Size)	$

Manila Clams (Market Size)	$
Seed or Larvae	$
Other	$

15.) Approximately what percentage of your Humboldt Bay related business revenue comes from shellfish sales? _____% (non-shellfish sales revenue could include tours, restaurants, merchandise, subleasing, etc)

Please list non-shellfish sales sources of revenue your company generates in the Humboldt Bay region:

_____

_____

16.) Does your company (both within and outside Humboldt Bay):

a. Operate another tourist attraction, such as farm tours offered on a regular basis? Y/N

If yes _____ % revenue

b. Operate a restaurant, oyster bar, or retail store? Y / N

If yes _____ % revenue

c. Sell branded merchandise related to your company? Y / N

If yes _____ % revenue

d. Have 3rd party certifications? Y / N

If yes, which certifications do you have?_____

17.) Approximately what percentage of your total business revenue comes from activities in the Humboldt Bay region? _____%

Comments on sources of revenue and anticipated changes in the next 5 years:

_____

_____

_____

SECTION G. MARKETS/MARKETING:

18.) Approximately what percentage of your Humboldt Bay produced market shellfish (not including seed & larvae) goes to these various types of outlets?

	2016	Est 5 yrs. out
Restaurants	%	%
Retail outlets	%	%

Wholesalers	%	%
Direct to customer	%	%
Arcata Oysterfest	%	%
Other: _____	%	%
Other:_____	%	%

19.) What US state(s) or country(s) do you purchase seed from? _____

20.) Have you experienced challenges getting oyster seed in the past 5 years? Y/N

What challenges? _____

21.) Do you have plans to get into or increase seed production in Humboldt Bay in the next 5 years? Y / N

Why? _____

22.) Approximately what percentage of your Humboldt Bay produced market shellfish (not including seed & larvae) is sold to these various locations?

	2016	Est 5 yrs. out
Humboldt County	%	%
California (not HumCo)	%	%
United States (not California)	%	%
Outside US	%	%

SECTION H. COLLABORATIONS/COMMUNITY WORK:

In 2016, how many Humboldt Bay-related scientific studies, community initiatives, or other engagement activities did your business participate in? _____

In 2016, approximately how many employee hours per month were spent on collaborative/engagement activities? _____

If comfortable, can you list the agencies, initiatives, or studies that you were/are a part of?

_____
_____
_____

SECTION I. FUTURE:

23.) Rank (in numbered order) your top five concerns/threats related to the sustainability of your mariculture business:

Tideland access/availability	Water quality
Permitting costs	Cold storage
Fuel costs	Land facility space/availability
Utility costs	Community perceptions
Labor costs	Regulatory changes
Changing ocean conditions	Disease outbreak
Price/market changes	Other 1:
Availability of seed	Other 2:

Why did you prioritize the threats that you did?

_____
_____
_____

ADDITIONAL COMMENTS ABOUT YOUR BUSINESS AND ANTICIPATED FUTURE CHANGES: