Feasibility Study for North Carolina Shellfish Mariculture Infrastructure



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EXECUTIVE SUMMARY

The shellfish mariculture industry has the potential to diversify North Carolina's coastal economy and provide high-wage, year-round jobs. The tourism sector dominates many of the more prosperous coastal areas while hurricanes require constant adaptation to rebuild sustainably. Ultimately, the coastal region must pursue economic resilience to bring prosperity to all residents. The state possesses over 1.4 million acres of coastal waters with biological and physical characteristics that make it uniquely well suited for shellfish mariculture. In addition to an abundance of prime growing waters, North Carolina has a long history of shellfishing, and commercial fishers with the skills and gear to run successful mariculture operations. There is potential to grow the industry well beyond its current \$7.5 million in total economic activity, to a valuation of \$100 million dollars by 2030. But this growth requires investment. This feasibility study describes key infrastructure needs identified by shellfish growers, and mariculture and economic development experts in the state. Improvements in (a) waterfront access; (b) storage, processing and distribution, and (c) business services and training are the investments needed to propel the industry forward to the next stage. A mix of public and private funding is available for these investments. A concerted and coordinated effort among shellfish growers and supportive organizations has the opportunity expand the industry's market share and take advantage of growing demand.

To meet some of the major needs identified in this study, the development of a network of shellfish mariculture incubators is recommended. This network would foster industry development as a whole and address specific regional industry needs. It would start with three regional incubators with planned future growth depending on regional needs and opportunities. The proposed initial network would consist of three infrastructure facilities with significant investment demand by shellfish growers: Carteret, Onslow and Hyde Counties.

SECTION A: NC Shellfish Mariculture Infrastructure Needs

1 INTRODUCTION

1.1 Diversification of the Coastal Economy

Some areas of coastal North Carolina have experienced significant population growth and economic development, while others struggle to make economic gains since the Great Recession of the late 2000s. In examining the state as a whole, poverty rates are highest in the inner coastal plain where the majority of counties have poverty rates above 20 percent (U.S. Census 2019). Counties closer to the coast have more economic opportunity and yet some of them still are challenged by high unemployment rates and outmigration. For example, Tyrrell County has a poverty rate of 25.2 percent and Hyde County has a poverty rate of 22.2 percent, indicating significant need. Figure 1 displays the state's counties and their poverty rates; the black rectangle roughly maps the coastal plain and the black triangles indicate Tyrrell and Hyde County.





The coastal region's economy is growing, but not as fast as the rest of the state. Total number of employees in the state's 20 coastal counties (defined by the Coastal Area Management Act) grew from 334,700 in 2009 to 361,424 in 2018, an increase of 8 percent. In the same time period, the total number of employees in North Carolina increased by 15 percent. The region's population grew at about the same rate as the state (9 percent), but many of those moving in are retired and out of the work force. The median age of North Carolina's population is 38.4, which is much lower than the majority of coastal counties. An ongoing question for the coast is which economic sectors can propel the region forward and allow young and working-age people to see their future here.

The coastal region excels across a broad range of industries including value-added agriculture, advanced manufacturing, and tourism, but must continue to make investments in these sectors to compete globally. The traditionally important commercial fishing industry has contracted in the state, raising questions about how this workforce will adapt. The state

continues to lose domestic seafood packing capacity, with a net loss of 47 facilities from 2001 to 2011, or a 36 percent decline in that decade (Garrity-Blake and Nash 2012). While natural amenities like attractive scenery and recreational opportunities draw tourists and retirees to coastal areas, many of the private sector jobs available to the permanent workforce are seasonal and low-paying.

Commercial fishers have begun to diversify their revenue streams by cultivating shellfish, thereby lessening their dependence on wild fisheries. Transitioning from high volume to more localized, diverse markets and expanding into retail trade and local food markets are some strategies being employed to increase profit margins. Farming seafood becomes all the more attractive as new restrictions on wild fisheries are enacted. In 2019, new closures were instituted for southern flounder, the number one finfish in the state by pounds landed and value – hastening the need for mariculture production.

Mariculture can increase and augment current job opportunities in economically distressed coastal areas. Marine industries, which include aquaculture, is a target industry for coastal areas like Carteret County, presenting the opportunity to grow an already strong base (Sanford 2017). Mariculture produces year-round products, stimulating entrepreneurship in a seafood sector that otherwise is dependent on tightly regulated and diminishing stocks of wild caught fisheries.

1.2 Rebuilding After Hurricanes

The coastal Carolinas are second only to Florida in the number of times they have been pummeled by hurricanes and nor'easters. And the intensity of hurricanes and nor'easters is increasing. Coastal storms are developing higher wind speeds, delivering more intense rainfalls, and driving higher storm surges ashore. In September 2016, Hurricane Matthew caused devastating impacts along the southeast U.S. coastline, claiming 31 lives in North Carolina and causing \$4.8 billion in damages to homes, businesses, public facilities, agriculture, roads and more across half of the state's 100 counties (Cooper 2017). Figure 2 illustrates the widespread impact with 50 North Carolina counties designated for federal disaster assistance.



Figure 2. Counties designated for federal disaster assistance after Hurricane Matthew. Source: FEMA (2016)

Then in September 2018, Hurricane Florence brought an unprecedented deluge of rain and storm surge leaving the state with 40 lives lost and \$13 billion in damage (Cooper 2018). The storm hovered over North Carolina for six days, inflicting even higher levels of rainfall, storm surge, and flooding than Hurricane Matthew only two years prior. While the impacts of Hurricane Florence were felt across the state, those who live in the southeast bore the brunt of the storm. Twenty-eight counties were designated by FEMA for federal disaster assistance. An estimated 2.6 million people, or one in four North Carolinians, live in one of the designated counties. Counties designated for individual assistance are: Beaufort, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin, Greene, Harnett, Hoke, Hyde, Johnston, Jones, Lee, Lenoir, Moore, New Hanover, Onslow, Pamlico, Pender, Pitt, Richmond, Robeson, Sampson, Scotland, Wayne, and Wilson.

Hurricane Florence and Tropical Storm Michael which followed a month later brought combined damages of nearly \$10 million to North Carolina's shellfish aquaculture industry, with significant impacts to facilities, gear and crops. Strong winds destroyed facilities and gear, while prolonged rainfall events resulted in diminished water quality and freshwater that makes oysters unsafe to eat, and can even kill them. There were at least 47 shellfish operation impacted, representing 257 acres, \$2.3 million in property damage losses, and \$7.6 million in product losses (NC Sea Grant 2019). All economic impacts to shellfish growers were selfreported and thus undervalued.

While hurricanes periodically bring economic damage to the state's coastal region, they do present an opportunity for rebuilding. For example, the U.S. Department of Commerce Economic Development Administration supports construction of new assets and renovation of existing assets to Presidentially declared disaster areas. The following North Carolina counties are eligible by special need due to disaster recovery needs after Hurricane Florence: Beaufort, Brunswick, Carteret, Craven, New Hanover, Onslow, Pamlico, and Pender counties (White

House 2018). Rebuilding ideally results in storm-ready infrastructure in which businesses and households are better prepared for the next major weather event.

North Carolina's coastal region also has the opportunity to jumpstart economic development via the Opportunity Zones Program (OZP) which encourages job creation, economic activity, housing and other community investments throughout the state. The OZP provides tax incentives for investors to re-invest unrealized capital gains into low-income communities. These communities are defined as low-income census tracks, which are areas where the poverty rate is 20 percent or greater and/or family income is less than 80% of the area's median income. In addition, they were chosen based on local recommendations and development goals, as well as to support state industrial site development initiatives. There are 252 opportunity zones in the state, and 29 in the coastal counties. Figure 3 displays such zones in the coastal plain region.



Figure 3. Opportunity zones (green) in North Carolina's coastal plain. Source: N.C. Department of Commerce (2019)

The NC Rural Building Reuse Program is another option for renovating buildings. The program provides grants to local governments to assist with building improvements that will lead to the direct creation of new, full-time, private sector jobs. The program requires a cash match equal to the grant request amount with at least 5% from the local government. Funding amounts are determined by the county tier level, industry type, and quantity and quality of jobs committed.

1.3 Economic Resilience via Shellfish Mariculture

Ultimately, the coastal region must pursue economic resilience to bring prosperity to all residents. Shellfish mariculture, that is, the commercial farming of bivalve shellfish – oysters, clams, and mussels – is an industry primed to grow in North Carolina. The state possesses over 1.4 million acres of coastal waters with biological and physical characteristics that make it uniquely well suited for shellfish mariculture. In addition to an abundance of prime growing waters, North Carolina has a long history of shellfishing, and commercial fishers with the skills and gear to run successful mariculture operations. North Carolina is also a leader in coastal research with many universities and technical colleges, non-governmental organizations, and management agencies actively engaged in interdisciplinary marine sciences and with the capacity to address research needs of a growing shellfish mariculture industry. A burgeoning local seafood movement occurring within North Carolina suggests new high-value markets for the existing 278 shellfish mariculture leases and new farms being established.

A 2018 North Carolina General Assembly-commissioned report argues that there is the potential to grow the industry well beyond its current farm-gate sales of \$2.5 million, which generate approximately \$7.5 million in economic activity based on a conservative 3x multiplier, to a valuation of \$100 million dollars in total economic activity (\$33 million farm-gate sales) by 2030 (SMAC 2018). Indeed, there is rapidly growing interest in entering the North Carolina shellfish mariculture industry, demonstrated by the nine-fold increase in bottom lease applications and 12-fold increase in water column lease applications between 2012 and 2017. Given additional support to develop new markets and expand market share, this growing industry can identify additional distribution networks and ways to integrate with established commercial fishing infrastructure, which currently supplies wild-caught seafood to profitable markets at state, regional, and national scales (Newsome 2014).

There is strong empirical evidence that North Carolina is positioned to dramatically increase its national market share of farmed shellfish and become a "Napa Valley of Oysters" given the recent growth of this industry locally, including the launching of a National Oceanic and Atmospheric Administration Shellfish Initiative in North Carolina, infrastructure investments that the State already has and continues to make, and diversity of growing environments and resultant oyster flavor merroirs across the state. In 2016, farm gate sales of bivalve shellfish was \$340 million nationwide with oysters being the number one species in production (37 million pounds) and value (\$192 million) (NOAA 2018). Over the next decade, North Carolina shellfish mariculture farm-gate sales could increase by nearly an order-of-magnitude, and attain overall economic impact on par with, or greater than, some of our state's 20 most valuable land-based crops.

There should be optimism that North Carolina is willing and eager to make investments to grow environmentally responsible jobs along the coast as proven by recent action: mandate for a Shellfish Mariculture Plan, authorization to develop shellfish aquaculture enterprise areas, establishment of larger lease sizes, flexible nursery siting, appropriations to establish and support a research shellfish hatchery at the University of North Carolina Wilmington (UNCW), re-funding of the northern Shellfish Sanitation Laboratory, recurring appropriations for a

shellfish pathologist position at North Carolina State University's Center for Marine Science and Technology (CMAST), funding for a Carteret Community College's (CCC) Aquaculture Technology Program, and legislative appropriations to perform studies on market demand for oysters, crop insurance program for shellfish growers and low-interest loan programs for the industry.

The shellfish mariculture industry sits at a crossroad relative to adopting innovative strategies to realize the potential of shellfish mariculture to support traditional and entrepreneurial fishers, coastal communities, tourism, and the state's unique estuarine environment. In addition to state regulatory changes and research and education funding appropriations, improvements need to be made to the mariculture industry's physical infrastructure, specifically land-based facilities and working waterfronts.

This study establishes the need for investments in new shellfish mariculture industry infrastructure. Such investments can play a pivotal role in economic development by stimulating and nurturing business enterprises, especially reducing barriers to new entrants. They are needed to support entrepreneurs during start up and/or expansion and can increase the probability of survival and growth at the most precarious time. Private industry growth as well as significant state support indicate positive return on such an investment. The state's shellfish mariculture industry has experienced tremendous growth over the last decade, and the emerging industry still has much potential to be realized.

What follows is an explanation of the need for specific shellfish mariculture infrastructure investments with evidence of entrepreneurial demand, state and community support, and conclusions for how to pursue investment.

2 INFRASTRUCTURE INVESTMENT NEEDS

Almost 40 interviews with N.C. shellfish growers and mariculture, seafood industry, and economic development experts were conducted in 2019 to identify improvements that could be made to the industry's physical infrastructure, specifically land-based facilities and working waterfronts. A list of interviewees described by occupation and geographic location is in Appendix A. Top needs include investments in (a) waterfront access, (b) product storage, processing and distribution, and (c) business services and training.

Entrepreneurial demand is location specific. Appendix B displays county maps – interviewees indicated specific locations for investment opportunities. The boat ramp's blue dot icon indicates a need for expanded waterfront access. The facility's red square icon indicates a need for storage, processing and distribution activities, which could also be an appropriate site for co-location of business services and training. The hatchery's green star icon indicates a need for a commercial shellfish hatchery. The highest number of investment opportunities (27) were noted for Carteret County, which corresponds with the County having the highest number of shellfish leaseholders (101) in the state (NCDMF 2019). The County also has the highest number of acreage in bottom and water column leases (355 acres). Onslow, Pender, and Hyde Counties have the next highest levels of shellfish grower concentration. Table 1 displays the number and total acreage of leases for all shellfish growing counties.

	Beaufort Carteret Dare Hyde New Hanover Onslow Pamlico Pe							
Number of Leases	2	101	10	26	10	46	13	46
Total Acreage	5.5	355	45	230	24	322	71	235

Table 1. Number and total acreage of shellfish leases per county. Source: NCDMF 2019

Investment demand was greatest in Carteret County and several locations were mentioned by five interviewees or more. These locations are Marshallberg (8 mentions), Morehead City (6 mentions), Newport River (6 mentions), Beaufort (5 mentions), and Carteret Community College (5 mentions). Stump Sound and Sneads Ferry in Onslow County were mentioned by seven and five interviewees, respectively, and Wanchese and the Outer Banks in Dare County were mentioned by six and five interviewees, respectively. Table 2 displays all counties and locations for investment mentioned by two or more interviewees.

County (Number of Mentions)	Locations for Investment (Number of Mentions)
Carteret (7)	Marshallberg (8); Morehead City (6); Newport River
	(6); Beaufort (5); Carteret Community College (5);
	Cedar Island (4); Bogue Sound (3); Down East (3);
	Harker's Island (3); Core Sound (2); Grayden Paul
	Drawbridge (2); North River (2)
Dare (2)	Wanchese (6); Outer Banks (5); Hatteras Island (3);
	Manns Harbor (3);
Onslow (3)	Stump Sound (7); Sneads Ferry (5); Turkey Creek (2)
New Hanover (3)	UNC-Wilmington (3)
Pender (1)	Topsail Beach (3); Surf City (2)
Pamlico (2)	NA

Table 2. Location for investment ranked by number of mentions

2.1 Waterfront Access

Waterfront access continues to be an issue in more populated locales and especially in the summer tourist season. High property values restrict how many shellfish growers can afford to purchase private waterfront property or rent boat slips. The highest cost for new growers is waterfront property. For those who must rely on public launch and storage facilities, they compete with recreational boat and commercial fishing user groups. Parking can be competitive in the high tourist season, and challenges growers to stay in compliance with strict rules for how long shellfish products can be out of the water before refrigeration. Launching a boat typically takes 10 to 15 minutes but could take one hour in the busy season, adding two additional hours to a day's work. Table 3 lists the locations where additional or expansion of boat ramps are needed to relieve congestion and provide waterfront access. Table 4 provides interviewee quotes to illustrate some of the waterfront access issues.

Table 3. Locations	for additional	or expansion	of boat ramps

Location	County
Beaufort	Carteret
Harker's Island	Carteret
High Rise Bridge (Newport River)	Carteret
Newport River	Carteret
West Beaufort Road (Newport River)	Carteret
Hatteras Island	Dare
Trails End	New Hanover
Wrightsville Beach	New Hanover
Sneads Ferry (New River)	Onslow
Stump Sound	Onslow
Turkey Creek	Onslow
Surf City	Pender/Onslow

Table 4. Examples of waterfront access issues

Quote	Interviewee
"There is a wildlife ramp [The Straits on Harker's Island] but it's a popular spot in	Carteret/Pamlico County
spring, summer, fall. There's also an overflow parking lot just off the bridge itself	shellfish grower
where you could temporarily unload gear and load boat. Not ideal as is. We are	
trying to get a floating dock permitted but how many people are going to spend	
\$30k on a dock for a 2 acre lease that I lose a few years in a hurricane?"	
"Trailer access is awful. Wrightsville Beach where we all put in, after 8 am any	New Hanover/Pender
day of the week and you can't get a spot. Holds 68 spots. No room to expand."	County shellfish grower
"No waterfront setup near the lease. That's what will keep me from making it a	Onslow County shellfish
scaleable business, the lack of the waterfront setup. Farmers that do this to	grower
some sort of scale have waterfront property where they can sort and	
tumbleThat's not feasible for most guys to have waterfront property."	
"If I made enough money, I would get a slip at one of the commercial marinas.	Aspiring shellfish grower
Looking at the marinas in the area though, all of them cater to rich people's	
yachts – sport fisherman related."	

Waterfront access needs vary from the most basic – a public boat launch with adequate parking – to infrastructure like dockage, gear storage, and nursery and hatchery systems. Nursery and hatchery systems require waterfront access. Seed is more expensive as it grows larger, and shellfish growers can cut costs using a floating upweller system (FLUPSY). Geographically dispersed nursery systems would reduce the need to transport and stress the organisms and mitigate hurricane impacts on seed production. Similarly, commercial hatcheries would reduce the need to purchase seed out of state that may not be ideal for local growing conditions.

A model for how to pursue public waterfront access comes from Manns Harbor Boating Access Area in Dare County. Fishermen worked with state, county, and non-profit partners to establish boat ramps, floating docks, commercial storage and shoreline docking facilities, a gravel parking lot, as well as a fish buying station. There is an area designated for commercial fishers and another area designated for recreational interests. A commercial fisherman who uses the infrastructure explains how they got started: "With WRC [Wildlife Resources Commission], we did a joint project. We kept commercial guys on one side and rec guys on one side. Then there are slips designated for charter boat captains. Only facility in the state that has allowed commercial fishermen to keep gear and boats on that property. Commercial gear can be placed in certain areas. Manns Harbor came up with new zoning rules to allow commercial fishing activity. Mark Bassnight got money allocated to purchase the property. It might have been \$5 million for the property. Then docks had to be put in. This spring they also paved each side of the marina. It's a great facility. We also worked with Dare County. They use some public works employees to maintain the grass and keep it clean. On the east side, someone from WRC maintains keeping the grass cut too."

Funds for Manns Harbor were also secured from the state's Waterfront Access and Marine Industry (WAMI) fund.

2.2 Product Storage, Processing and Distribution

The logistics of getting oyster product from the water to a buyer can be a complex puzzle. For growers to expand oyster production, they must continually make investments in product storage and processing equipment, as well as identify new distribution channels. Some growers work together to share storage and processing expenses, as well as market opportunities. This allows them to sell larger quantities at a consistent volume to buyers who otherwise might not be interested. Others go it alone and drive longer distances to drop off product at meeting points on established seafood distribution routes.

Centralized shellfish storage and processing hubs have the potential to scale up the oyster mariculture industry. They would encourage the formation and sustainability of regional grower cooperatives which can command a higher product price at consistent volumes. Such hubs could include access to specialized mariculture equipment at reduced rates. Interviewees described the features and equipment an ideal facility would have:

- Loading ramp
- Accessible by 16-foot and 18-wheeler trucks
- Cold storage and refrigeration/mechanical refrigeration
- Upwelling tanks for wet storage
- Overhang to sort and grade
- Pressure washing station
- Equipment to grade and sort oysters (e.g. tumbler)
- Seed shaker
- Key codes with camera
- Small pallets with a pallet jack and decent walk-ins
- Storm-ready infrastructure (e.g. back-up generators)

Multiple facilities are needed to serve growers throughout the coast. Such hubs are in development in various communities – Marshallberg, Hatteras Island, and Stump Sound for example. Some hubs may be co-located or incorporated into existing fishhouses which already have refrigeration equipment and distribution networks. Table 5 provides interviewee quotes to illustrate some of the needs for product storage, processing and distribution.

Quote	Interviewee
"Would be a godsend to have facility with refrigeration, a distributor to pick up, as well	New Hanover/
as sorting, washing, and grading equipment. If there are 6 guys in a region with 6	Onslow/Pender County
different fridge units and they concentrated into one, that would be much more	shellfish grower
attractive for distributors."	
"Could work with a local (running or out of business) fishhouse with a dock who has	Carteret County shellfish
refrigeration and use those existing resources."	grower
"Collective packing and refrigeration would be nice. Having a place to clean and bag the	Pamlico/Carteret County
oysters, that people did for a variety of brands, in a cooperative fashion, would lighten	shellfish grower
the load. The less you have to do on the water when you don't have a dock with a	
pressure hose or freshwater hose. There could be economies of scale re: paperwork,	
becomes an easier task for most people."	D (1) 1 0
"Very little seafood processing going on overall. People aren't doing value added. Real	Dare/Hyde County
processing requires freezer space."	economic development
	expert
Tumbler could be a communal piece of equipment at a centrally located facility. As	Carteret County shellfish
well as washdown and sorting. The small tasks can be huge labor costs. Need a land	grower
based area to unload product and store for cooling. A lot of fishers have this	
finhastructure and are not using it; would be a sname to let it go; better to get the	
"The whole supply chain is out of state from the seed to the gear "	Onclow County oconomic
The whole supply chain is out of state from the seed to the gear.	development expert
"Distribution has been a challenge. The coast of NC is so isolated from most major	Onslow County shellfish
metropolitan areas. Raleigh is a couple hours from me in Wilmington. The next closest	grower
metro area is Charlotte and Richmond DC Getting our product out there can be a	5.000
challenge. Virginia lucked out with DC. Baltimore. Richmond, major metro areas around	
them."	
"There was a guy from SC that wanted ovsters from up here but there's no real channel	Dare County shellfish
of distribution south from here. You have large markets down there – Myrtle Beach,	grower
Charleston, Hilton HeadIf you don't have a mobile refrigerated transportation, you	
can't get your product off your farm. If I didn't have the van, someone would have to	
come and get them from me in their van. That's a shellfish sanitation rule. Getting the	
van was a necessity for us to move forward."	
"Oyster farming is easy but getting it off the farms and to the restaurants is the hard	Onslow County shellfish
part. Harvesting, processing, tagging is hardA more centralized distribution could help	grower
people. Everyone can't afford the correct refrigeration. Multiple locations are needed."	
"These guys gotta do a co-op. All these growersthey can't go from zero to supplying	NC/SC seafood distributor
multiple guys 5000 oysters/week. They are all really good at selling 2000 oysters/week.	
I think a co-op of 3 or 4 growers, or whatever amount of growers in the same area. They	
can all call the oysters different things [brands]."	
"Regional co-ops could help to develop markets in western NC and out of state. Could	Carteret County
be an Outer Banks co-opmaybe wouldn't have to be a facility but a contract to tie in	aquaculture expert
logistics, storage, and distributions. Also a Down East/Carteret County regional co-op	
and Unslow/Pender regional co-op. At this point not clear that a facility is needed.	
Except for maybe Down East where smaller growers could locate product that could have fit them "	
Denenit them."	New Llenever /Develor
should be the second and for the second the second terms of the second terms of the second terms and the second terms of terms	New Hanover/Pender
sitemisting rowers used one redex account number. \$23 to ship 200 pounds of oysters	county sneinsn grower
number Island Creek Ovsters in Massachusetts organized a collective account for	
growers in their area "	
	1

Table 5. Needs for product storage, processing and distribution

Growers investing in these storage, processing and distribution hubs can further expand their businesses with gear assembly and repair services, retail sales, and even tourist attractions. Aquaculture production gear is currently produced out of state. Further development of the shellfish mariculture supply chain could cut cost for North Carolina growers, and provide additional job opportunities. Growers could also invest in a retail element to sell product directly to consumers, or tourist activities like shellfish farm tours. Already a few growers offer such tours.

Capital investment and proper management is key to any logistics hub that requires regional cooperation. For example, fishers work together to supply the Ocracoke Seafood Company, the only seafood dealer on Ocracoke Island. The business is viable because of early financial investments in the physical infrastructure and transparent community leadership. They sell to wholesale markets and operate a retail outlet, popular among summer tourists. The fish house is a subsidiary of a 501C3 organization the Ocracoke Foundation which secured vital grants and loans from the NC Rural Center, Golden Leaf Foundation, Hyde County revolving loan fund, and Tideland Electric Membership Cooperative to lease land, do building renovations, and purchase a barge.

2.3 Business Services and Training

Access to business services and training is another need for many growers. Key business support services needs include assistance with financial capital acquisition and crop insurance. Revolving loan funds for shellfish growers have been established in other states (e.g. Alaska, Maryland), allowing new and established growers to more quickly scale their operations. Recent recommendations to the NC General Assembly include establishment of a low-interest loan program with a one-time appropriation of \$2 million, following the model set forth by Maryland's Agricultural & Resource-Based Industry Development Corporation Shellfish Aquaculture Loan Fund and Remote Setting Aquaculture Loan Fund (SMAC 2018). Land-based producers have access to crop insurance programs, whereas shellfish growers have little recourse when a hurricane hits. Training and education are needed with regards to production technology and regulations. Higher education institutions like Carteret Community College offer a one-year diploma in aquaculture technology, and will soon offer shorter-term education via a Shellfish Academy.

Growers already take advantage of some free business services and entrepreneurial training. For example the North Carolina Small Business and Technology Development Center (SBTDC) provides management counseling and educational services to small and mid-sized businesses free of charge. The SBTDC operates 10 regional service centers in 15 total offices associated with a local university or community college. The Centers assist with development of business plans, marketing, and accounting and financial management. Organizations like Fish 2.0 bring innovators and investors together to grow the sustainable seafood sector, including mariculture. It helps more mature firms prepare for external financing and angel investing.

Ultimately business services and training need to be available that assist potential, emerging and experienced growers. They should help new growers ease into the market and

mature firms prepare for external financing. Business services explicitly focused on the shellfish mariculture industry can facilitate entrepreneurial activity among growers and increase the number of jobs in the industry. For instance the Maine Aquaculture Business Incubator has a 11,500 square feet facility dedicated to aquaculture start-ups and mature businesses seeking to develop new technologies. North Carolina shellfish growers do not have access to such a facility, but benefit from trainings and one-on-one extension services provided by entities like North Carolina Sea Grant and North Carolina Department of Agriculture, as well as networking opportunities like Oyster South and the North Carolina Oyster Summit which result in information sharing and technological diffusion. Table 6 describes some of the needs for business services and training among shellfish growers.

Table 6. Needs for business services and training

Quote	Interviewee
"Information support is a major challenge. You can't go on the internet to find NC specific	Carteret County
information. I was trying to cut back on labor and to see if I could use my mom's 150 ft dock, and	shellfish grower
put a floating system under it, or a suspended longline. I'm looking into what permits are needed,	
if it's possible, nobody knew."	
"Specific grower loans would help with financial capital."	
"Business incubators can benefit complete start-ups to more mature businesses that want to do	Maine aquaculture
research leading to commercialization. Success is connected to entrepreneurial development	expert
how to raise equity, do pitches, grant writing."	
"I'm retired out of the army. I'm a veteran. The USDA and FFA loves the veterans which helps	Carteret County
streamline financing. Requiring funding is not a personal challenge for me. I can access it. I want	shellfish grower
to speak on other people's behalf – if you want to start a big leaseif you own a boat you're still	
looking at \$30k-\$50k to get going. General education to lending institutions is a challenge. Low	
interest loans are needed."	
"Start-up costs for gear and suppliesthere's not a clear pathway. No nice loan programs. Farm	Carteret County
Service agency has a low-interest loan for agricultural producers."	aquaculture expert
"I attended CCC aquaculture program to decrease my learning curve. I'm a year 1 grower, no	Carteret County
harvest yet. Going to school for a year helped me a lot. Knowing what tools to use, site selection,	shellfish grower
knowing who to talk to. I commercial fish: 60% commercial fish/40% shellfish farming. As the	
regulatory bodies put a squeeze on fishing, that number will continue to flip flop. I want to	
expand my business into finfish farming if everything works out."	
"The biggest challenge is information. It took me a month to get figure out what kind of license	Onslow County
you need."	shellfish grower
"Difficult for a financial institution to sink its teeth into this long return period where a shellfish	Coastal economic
grower has to get a lease, have the Army Corps approve it, invest in gear and seed, harvest after	development expert
12-18 months if everything works out. Usually growers have to go through that first successful	
harvest on their own dime. Financial institutions will only be interested after a few years of	
success. A lot of supportive spouses are needed in this industry, with secondary income."	
"Fishermen have flounder gear now that's useless. Third of my income is flounder fishing. I've got	Carteret County
30 pound nets. Over \$100,000 in gear that's useless. I want to get some big floating cagesRight	shellfish grower
now I'm using floating bags. I borrowed \$2500 to get through this month. I bought a quarter	
million seed. You gotta move this seed up to the 9 mills, and then to the 14 mill bags. Battling	
with moving these seeds. I don't have the gear that I need. Trying to buy a little bit. Starting up –	
gear costs a lot of money. We've already put \$34,000 in gear. A little bit overwhelming when	
you're starting off from scratch."	
"There is a big need for continuing education. It's a brand-new industry, especially for folks who	Wake County
don't have a lot of watermen experience and they're not from the coast."	seafood distributor

3 STATE SUPPORT

Investments in mariculture infrastructure would augment a number of state supported initiatives. In 2016, the North Carolina General Assembly passed legislation (S.L. 2016-94 Section 14.11.(d)) directing the North Carolina Policy Collaboratory to convene stakeholder meetings aimed at advancing efforts to bolster the state's shellfish industry (NCSMAC 2018). Senate Bill 257 (Section 13.13.(b)) amended this legislation, adding a mandate for the preparation of a Shellfish Mariculture Plan completed by December 31, 2018. This legislation resulted in the formation of the Shellfish Mariculture Advisory Committee (SMAC), comprised of 50+ stakeholders who met over 20 times in person and communicated extensively between meetings. The SMAC developed 21 major recommendations, with recommendation #1 being to achieve \$100 million annual shellfish mariculture value (\$33 million dockside sales) by 2030.

To deliver \$100 million in value, a number of state legislative changes and investments were recommended. The following recommendations are examples of those that correspond with infrastructure investments:

- Recommendation #3: Establish a low-interest loan program to provide start-up and expansion capital to shellfish growers
- Recommendation #11: Designate appropriate tracts as shellfish enterprise areas containing multiple, connected parcels available for shellfish mariculture
- Recommendation #12: Grant up to three 50-acre (each contiguous) water column or bottom leases, each obtained by a single lease application
- Recommendation #15: Amend North Carolina General Statute §113-203 to allow nursery of shellfish in waters classified as prohibited
- Recommendation #20: Establish a Mariculture Resource Grant Program that funds grower-led projects

In 2019, to support shellfish mariculture industry growth, the North Carolina General Assembly (NCGA) codified into law several changes in alignment with SMAC recommendations. The NCGA:

- Authorized establishment of shellfish aquaculture enterprise areas preapproved zones for growing shellfish, such as oysters and clams
- Authorized three pilot projects up to 50 acres in size in the Pamlico Sound.
- Mandated that North Carolina Division of Marine Fisheries (NCDMF) explore establishing shellfish enterprise areas.
- Allowed shellfish growers to use waters currently off limits to grow seed oysters through the early part of their life cycle and then transport them to approved shellfish waters. This flexibility will help growers to ultimately cut costs.

Also, in 2019, the NCGA planned to appropriate funding in alignment with SMAC recommendations. State budget negotiations unrelated to mariculture put those appropriations on hold until the 2020 legislative session. Appropriations planned included:

- Funds to support N.C. Shellfish Growers Association's efforts to develop a pilot Federal Crop Insurance program for farmed shellfish (\$30,000).
- Market analysis specific to North Carolina's shellfish mariculture products (\$50,000).

- Recurring funding to establish a new Shellfish Leasing Section at the N.C. Division of Marine Fisheries.
- Funds for a state oyster festival at Morehead City, Carteret County.
- Funds for Carteret Community College Aquaculture Program.

4 COMMUNITY SUPPORT

Shellfish mariculture expansion requires community support. In addition to threats from hurricanes and water quality degradation, social perceptions and user conflicts are among the top challenges facing the industry expansion. Social conflicts have mainly stemmed from not-in-my-backyard (NIMBY) mindsets and public trust waters user conflicts. Recognizing these challenges the NCGA: (1) placed temporary lease moratoria on Bogue and Masonboro Sounds and (2) mandated that NCDMF perform a study examining social user conflicts and find mechanisms for solving them. The NCDMF will also conduct a detailed marine spatial planning to determine the best uses of public trust water bodies and delineate areas best suited for shellfish leases.

One potential solution to social conflicts in highly contested areas is the implementation of shellfish enterprise areas (SEAs) approved by the 2019 shellfish legislation. These are large tracts in the water subdivided and designated for growing shellfish. Before the grower is ever involved, the NCDMF will identify sites where there are few or no public trust conflicts and go through the public process of obtaining a lease permit, including public hearings. Upon becoming a lease holder NCDMF will subdivide and lease out parcels within a SEA to individual growers through a simpler permitting process. This process not only alleviates social conflicts but also reduces barriers to entry by streamlining lease application process. Anticipating that this mechanism could be a solution to user conflicts, the NCGA has allowed the use of SEAs in the moratoria areas.

Another benefit of SEAs is that aggregation of leases would encourage new supporting supply chain sector businesses which could develop in the business incubator program. Grower concentration could, for example, attract an oyster gear manufacturing and repair service business, which could be co-located with business support services. One goal of SEAs is to remove barriers and shorten the process for growers to have leases approved. The areas also allow the public to weigh in on lease sites at the front end – a more proactive approach to determining potential user conflict and building community support.

5 CONCLUSION

Investments in shellfish mariculture infrastructure are needed to accelerate the development of the industry's entrepreneurial companies and position the industry as a leader in the region with expanded market share. Public and private partners have a role to play. Public funding agencies like the U.S. Department of Commerce Economic Development Administration and N.C. Department of Commerce can help build and renovate facilities, while private capital has the flexibility required for any investment need. Funds can also be leveraged from public agencies and funders like the Wildlife Resources Commission and Golden Leaf Foundation.

Strong demand for cultivated oysters begs the question: How will North Carolina producers benefit? National prestige is growing regarding the quality and diversity of product from the state's coastal waters. Local support for mariculture continues to advance with increasing public awareness and its impact on the coastal economy. Infrastructure investments like (a) waterfront access, (b) storage, processing, and distribution, (c) and business services and training would allow the industry to create greater economic impact. Scaling up further increases visibility and provides a foundation to sustainably grow the mariculture industry to \$100 million in value.

Shellfish grower demand indicates the highest number of investment opportunities are in Carteret County, which also has the highest number of shellfish leaseholders in the state. Onslow, Pender, and Hyde Counties have the next highest levels of shellfish grower concentration, and significant investment demand as well.

Ultimately, shellfish mariculture incubators are needed to encompass multiple infrastructure requirements to scale up the industry. Waterfront access is critical. Those needs vary from the most basic – a public boat launch with adequate parking – to infrastructure like waterfront dockage, gear storage, and nursery and hatchery systems. Multiple facilities for centralized shellfish storage and processing hubs are needed as well. An ideal facility would have a loading ramp, cold storage and refrigeration/mechanical refrigeration, upwelling tanks for wet storage, an overhang to sort and grade, a pressure washing station, equipment to grade and sort oysters, a seed shaker, key codes with camera, small pallets with a pallet jack and walk-ins. It would also include storm-ready infrastructure (e.g. back-up generators) and be accessible by 16-foot and 18-wheeler trucks. Finally, business services and training are needed to assist potential, emerging and experienced growers. They should help new growers ease into the market and mature firms prepare for external financing. Many entities already offer business services and training, and yet some growers are unaware of these offerings. Mariculture incubator hubs would be one-stop shops to discover these resources and engage in peer-to-peer learning that is absent on isolated, individual farms.

6 RECCOMENDATIONS

To meet some of the major needs identified in this study, the development of a network of shellfish mariculture incubators is recommended. This network would foster industry development as a whole while addressing specific regional industry needs. It would start with three regional incubators with planned future growth depending on regional needs and opportunities.

The proposed initial network would consist of three infrastructure facilities built simultaneously and located in areas not only highly recommended by the participant stakeholders in the study but also with the highest numbers of existing leases and total leased acreage: Carteret, Onslow and Hyde Counties (figure 4). However, if funds were unavailable to develop the three facilities concurrently, we propose their construction in a staggered order as presented below.



Figure 5. Total shellfish leases (bottom, water column, franchise) in North Carolina by county (north to south) and lease type.



Figure 4: Total shellfish lease acres (bottom, water column, franchise) in North Carolina by county (north to south) and lease type. Source: N.C. DMF

6.1 Shellfish Mariculture Incubator in Carteret County

The highest number of investment opportunities in the study was noted for Carteret County. A site owned by the Carteret County was identified as an optimal location for a shellfish incubator. The property is 8.35 acres (figure 5). Two acres on the water edge would be dedicated for the shellfish incubator.

Initially, this incubator would support around 20 jobs (two jobs for every of the 10 available spaces in the facility) and potentially the creation of many more.

This incubator could service the 17 existing shellfish leases in the vicinity of the site (45 minutes' drive) and those pending of approval, but also a good portion of the remaining leases in the county (Table 7). The incubator would provide the main needs identified by the study:

1) <u>Water access</u>: The incubator would be located on the water's edge. It would contain a dock providing access to waters open for shellfish harvest in the E6 growing area (as classified by the Shellfish Sanitation and Recreational Water Quality).

2) <u>Cold storage, processing and distribution area</u>: The site would be equipped with cold storage and mechanical refrigeration, a loading ramp, pressure washing station, equipment to sort and grade product among other equipment and be accessible by 16-foot and 18-wheeler trucks.

3) Potential dockage for tenants' vessels

4) <u>Gear storage</u>

5) <u>Business services</u>: the incubator would provide peer-to-peer learning, a crucial element for startups and businesses in early stages of development.

CARTERET COUNTY SITE				
Lot Size	8.35 acres*			
Ownership	Carteret County			
Waterfront Access	Yes			
Existing Structures	No			
Existing Dock	No			
# Leases in vicinity	17			
# Leases Carteret County	137			
Lease potential (current # of lease	4			
applications in the area as of 2020)				

Table 7: Carteret County site characteristics

*About 2 acres of the site on the water edge would be dedicated to the shellfish incubator



Figure 5: Map of the Carteret county proposed site

6.2 Shellfish Mariculture Incubator in Onslow County

Onslow County was the second highest mentioned area in the study. The county site with the highest number of recommendations was Stump Sound. Based on this information Morris Landing Clean Water Preserve, a site owned by the North Carolina Coastal Federation, a state-based environmental non-profit organization, was identified as an optimal location for a shellfish incubator (figure 6).

The 52-acre preserve contains coastal shrub scrub and forest habitat, salt marsh and tidal creek areas and has over 3,000 feet of shoreline along Stump Sound. The preserve is located in the heart of the very productive shellfish growing areas of Stump Sound.

The incubator on this site would service the 21 existing shellfish leases in the immediate vicinity of the site and six leases in permit process. Given the site's proximity to Pender County it could serve a good portion of its 56 permitted leases (Table 8). Initially, this incubator would support around 20 jobs (two jobs for every of the 10 available spaces in the facility) and potentially the creation of many more.

The incubator would provide the main needs identified by the study:

1) <u>Water access</u>: The incubator would be located on the water's edge. It would contain a dock providing access to waters open for shellfish harvest in the B9 growing area (as classified by the Shellfish Sanitation and Recreational Water Quality).

2) <u>Cold storage, processing and distribution area</u>: The site would be equipped with cold storage and mechanical refrigeration, a loading ramp, pressure washing station, equipment to sort and grade product among other equipment and be accessible by 16-foot and 18-wheeler trucks.

3) <u>Gear storage</u>.

4) <u>Business services</u>: The incubator would provide peer-to-peer learning, a crucial element for startups and businesses in early stages of development.

ONSLOW COUNTY SITE				
Lot Size	52.24 acres			
Ownership	North Carolina Coastal Federation			
Waterfront Access	Yes			
Existing Structures	No			
Existing Dock	Yes			
# Leases in vicinity	21			
# Leases in Onslow County	82*			
Lease potential (current # of lease	6			
applications in the area as of 2020)				

Table 8: Onslow County Site Characteristics

*Given to its proximity to Pender County this site could service the 56 leases from that area as well.



Figure 6: Map of the Onslow County proposed site

6.3 Shellfish Mariculture Incubator in Hyde County

Engelhard Marine Industrial Park in Hyde County has been selected as the most suitable site in the northeastern region of the coast (figure 7). Hyde County was recognized by study participants as an important area for shellfish aquaculture potential in the state. The Park is nestled in the historic fishing village of Engelhard. The 8-acre site sits on Far Creek, a federally maintained navigational channel. Engelhard is a hub in the commercial fishing industry, with many seafood businesses located along Far Creek adjacent to the Park.

The site is adjacent to open shellfish waters in Pamlico Sound. This area holds unrealized shellfish aquaculture potential, especially for large-scale farms. A state shellfish aquaculture law passed in 2019 allows for three large 50-acre shellfish leases to be created in Pamlico Sound. The Engelhard Industrial Park would be an excellent site for processing and storing products from such leases.

Furthermore, the existing facilities at the site have been recently leased to a seafood startup business focusing on distribution of regional seafood. The proposed incubator would have added benefits of possible synergistic effects with the existing startup on site.

Initially, this incubator would support around 20 jobs (two jobs for every of the 10 available spaces in the facility) and potentially the creation of many more. The site would be located in a large opportunity zone (figure 3). The opportunity zones provide tax incentives for investors to re-invest unrealized capital gains into low-income communities, thus providing incentives for business development.

The incubator would provide the main needs identified by the study:

1) <u>Water access</u>: The incubator would be located on the water's edge. It would contain a dock providing access to waters open for shellfish harvest in the G5 growing area (as classified by the Shellfish Sanitation and Recreational Water Quality).

2) <u>Cold storage, processing and distribution area</u>: The site would be equipped with cold storage and mechanical refrigeration, a loading ramp, pressure washing station, equipment to sort and grade product among other equipment and be accessible by 16-foot and 18-wheeler trucks.

3) Potential dockage for tenants' vessels

4) <u>Gear storage</u>

5) <u>Business services</u>: The incubator would provide peer-to-peer learning, a crucial element for startups and businesses in early stages of development.

Table	9:	Hvde	County	Site	Characteristics

HYDE COUNTY SITE				
Lot Size	8 acres			
Ownership	North Carolina Department of Commerce			
Waterfront Access	Yes			
Existing Structures	Yes*			
Existing Dock	Old docks			
# Leases in vicinity)	4			
# Leases in Hyde County	44			
Lease potential (current # of lease	0**			
applications in the area as of 2020)				

*Currently leased to a private business

** Potential for three large 50-scale leases in the region due to recent regulatory changes



Figure 7: Map of the Hyde County proposed site

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SECTION B: Management and Operations Plan and Five-Year Proforma for NC Shellfish Mariculture Infrastructure

1. MANAGEMENT AND OPERATIONS PLAN 1.1 Mission, Objectives and Benefits

In general, the mission of any business type incubator, including industry specific ones such as shellfish, is to increase the successful development of emerging businesses in sectors that are supported by a state's or region's unique opportunities. Typically, businesses that graduate from an incubator move out into the community and contribute to the overall economy, by providing diversity and growth. Incubators provide an environment that allow a region to take an active role in growing their own businesses that will lead to job creation and other economic impacts, including new tax generation.

1.1.1 Recommended Objectives and Mission

The incubator would serve as a hub for start-up shellfish growers and would actively identify and provide value-added services required to support the success of incubator clients.

Based on a feasibility study completed by the NC Coastal Federation, preliminary objectives that provide measurable outputs and outcomes to support the incubator mission may include the following:

- 1. Create new job opportunities for area residents
- 2. Create higher wage jobs
- 3. Better leverage state and county resources including available shoreline for lease
- 4. Contribute to the growth and success of shellfish growers in the region
- 5. Generate new tax revenues for the county and the state in general.

A possible (recommended) mission statement for the shellfish incubator could be the following:

"Our mission is to stimulate the establishment and growth of shellfish grower start-up companies and to increase the number of successful companies originating and developing in the area. We help emerging shellfish growing companies gain access to mentors, training, shared space and equipment, professional assistance, capital, and other services that will move them onto the fast track to success. By fulfilling our mission, we expect to contribute to job creation and enhanced economic health in the region."

1.2 Benefits to Stakeholders

A successful shellfish incubator would benefit a wide range of stakeholders in eastern NC and beyond. Key stakeholders would include:

- Nascent shellfish companies (incubator companies) and their employees,
- the community (including surrounding area and the region),
- area higher educational institutions (Carteret Community College (CCC), East Carolina University, etc.).

2.1 Benefits to Incubator Companies

Companies that are accepted into incubators enjoy dramatically improved success rates as their business enterprises are nurtured through early development years.

Specific benefits include: **Reduced Barriers to Entry** - Per IBISWorld Report culture of oyster, clam and some other molluscs does not require feeding as these organisms survive by simply eating algae and other materials naturally found in water. Capital costs associated with entering the industry can be high. A company can also incur significant capitals costs in efforts to improve yield and efficiency. When capital costs are coupled with the constrained growth prospects associated with import competitiveness, lenders are likely to regard the activity as a high risk. As a result, access to funds on favorable terms may not be possible. The incubator environment would provide much more affordable starting costs for emerging companies by offering affordable office space, access to shared equipment, meeting facilities, and business and technical assistance. This lowers the overhead and operating costs during critical formative years.

Networking and Mentoring - The incubator would facilitate a 'know-how' network to address incubator companies' unique needs for partnerships, supply chain connections, and/or potential sources of capital.

Increased Visibility - The incubator would significantly increase visibility and presence of tenant companies in the marketplace and advance their success potential. Admission to the incubator would imply an endorsement that enhances new companies' statures and increase their chances to secure funding.

2.2 Benefits to the Community

The overarching benefit to the community is increased economic health and vitality.

Specific benefits include:

Job Creation - Incubator companies would create new employment opportunities for area residents.

Enhanced Image - A business incubator is one important element to enhance Carteret, Onslow and Hyde County's image as areas with low business costs and an incredible coastal lifestyle that encourages and supports shellfish growers.

Increased Entrepreneurship - A business incubator can create awareness of entrepreneurs and stimulates confidence among individuals to consider opportunities for business creation.

Increased Tax Revenue - New jobs and new businesses in the incubator and those businesses that graduate from the incubator and spin-out into the community would generate a larger, more diverse tax base to support public services and contribute to many facets of community livability and health.

2.3 Benefits to Area Higher Educational Institutions

Local college and university graduates in aquaculture, marine sciences, and business programs will have a fast-track opportunity to begin their own shellfish venture.

Specific benefits include:

Pipeline from the classroom to entrepreneurship - Carteret Community College (CCC) offers the Aquaculture Technology program which emphasizes applied marine sciences and mariculture, while other higher educational institutions including East Carolina University (via the Coastal Studies Institute), NC State University Center for Marine Sciences and Technology, and University of North Carolina Institute for Marine Sciences offer marine and coastal science degrees, positioning the next generation workforce to work in aquaculture careers. Many of these institutions also offer business degrees and certificates, laying the foundation for entrepreneurial success. Graduates of the CCC Aquaculture Technology program for example typically find employment on private farms and government hatcheries. For graduates with an entrepreneurial mindset, the shellfish incubator would provide them an opportunity to advance their own venture.

Expanded Outreach – Business support service programs at area higher education institutions will be able to extend their service base. For example, the Small Business Center (SBC) at CCC can serve shellfish incubator clients through educational seminars, training classes, and counseling. Additionally, the Small Business and Technology Development Center at East Carolina University can further work with these companies as they graduate from the incubator and are seeking funding to expand their operation and hire more workers.

3. NORTH CAROLINA SHELLFISH INCUBATOR (NCSI) PROPOSED STRUCTURE AND MANAGEMENT

The Executive Board would consist of individuals and organizations that share the vision for the incubator and provide expertise that would contribute to the ability of the incubator to fulfill its mission. The full Governing Board would be comprised of approximately 5-11 members. Along with resource partners, the Board should consist of representatives from the private sector with notable expertise relevant to the incubator clients and critical public sector economic development groups.

Recommended list of the types of resource network of service providers or the incubator include:

Resource Partners
 NC Coastal Federation
 Carteret Community College
 East Carolina University
 Small Business and Technology Development Center
 Small Business Center

2- Professional, Technological and Financial Expertise Industry Representative(s) Financial Institution/Bank Legal Marketing Accounting Real Estate 2 Economic Development Entities

3- Economic Development Entities County Economic Development Org. Chamber of Commerce EDPNC NC Commerce

3.1 Board Duties

The primary function of the Board is to establish policy guidelines for incubator operations and to assist in screening prospective incubator tenants. Board members should be the link to industry networks that would assist the incubator's Executive Director in creating connections to investment and professional resources that support the success of incubator clients. The Board would be instrumental in promoting the incubator in the community and generating awareness and understanding of the incubator as an important, forward-thinking economic development tool for the area.

The Board would also be responsible for planning and formulating policy to guide the programmatic direction of the incubator, hiring the Executive Director position, and ensuring the overall financial viability of the incubator.

In performing their duties, boards of successful incubators are characterized by a more entrepreneurial versus administrative approach to managing incubators. They allow the incubator to run like a business which involves timely responses to the decisions that come up day-to-day.

3.2 Staffing

At start-up, the proposed incubator staffing would include a full-time Executive Director, and later when revenue supports it a part-time receptionist. The staff would provide services to incubator businesses, cultivate resource networks, manage facility development, and manage

ongoing operations. Subsequent increases in staffing hours and levels would depend on increases in workload and funding availability.

3.3 Executive Director

A Director will be hired to manage the overall operations of the incubator and coordinate with resource partners to provide direct business assistance to clients, engage and coordinate with appropriate educational institutions for internships and student team work as appropriate. The Director will support, mentor, and monitor the performance of participating tenants, and track performance on other project goals.

The Director would report to the Board, and provide the daily energy and hands-on mentoring that is catalytic to the incubator's mission. The Director must be experienced in the industry, have a well-rounded understanding of business management, facilitative leadership ability, and strong interpersonal skills.

The ideal Director would be well connected to professional and technical knowledge networks in the community and serve as a conduit to a resource network of service providers that provide expert assistance to incubator clients.

We expect that during the first couple of years this position will be part time, only working a portion of the time. The salary paid reflects that. Additionally, the person hired for this position will take all steps necessary to secure a dealer's license and serve as a dealer for the incubator tenants, thus supplementing their income and providing a one-stop shop solution for the businesses. This model may be re-evaluated on an annual basis to make sure that the tenants are being appropriately served and the compensation for the Director is adequate.

Annually, the Director will provide a written report of program results to date to the board of directors.

The Director will work with the three selected members of the Board to form the Tenant Selection Committee (TSC) that will oversee screening, evaluating, and selecting small business participants based on established eligibility criteria and process. Selection criteria will include:

- soundness of their business plan,
- viability of their product or service,
- financial stability, and
- individual qualifications.

The proposals can either be for a new business or, with some limitations, the expansion of an existing business from outside of the Carteret County area.

4. CLIENT SELECTION

Client selection and graduation are critical to a successful incubator. The screening process should be customized to meet the incubator's mission and ensure the firms selected can benefit from its value-added services.

Applicants will complete a pre-qualification application, which may be obtained on-site from at the Incubator or requested by mail or email. Please refer to exhibit A for a sample application.

4.1 Application Process

The proposed application process for prospective incubator clients involves two to three steps. The application process should be completed within about five days.

Step 1: Complete Application - All prospective clients would complete a brief application form. A completed application provides the incubator with a brief description of the applicant's current business status, and a very preliminary sense of the applicant's service and facility needs. For a sample application form please see Appendix C.

Step 2: Provide Business Description or Business Plan - Prospective clients that complete Step 1 and are determined to be a potentially eligible tenant, would be required to augment their application with a business plan or written business description. The TSC would review the document. The document should provide in-depth information about the stage of business development, market potential, and overall potential for success.

Step 3: Present to Incubator TSC - The prospective client would present their business case to a small panel of three comprised of the TSC members and answer questions concerning their plans and goals.

The TSC will review the applicants' proposals and business plans and make its final selection of those to be admitted to the Incubator Program.

The Director will notify applicants of their status in the Incubator Program. Those selected for participation will then begin the process of enrolling in the Incubator Program and getting their business started.

4.2 Eligibility Criteria

To be eligible to apply, the prospective client must satisfy the following requirements:

- a- Their proposed business must be defined as a corporation, partnership, or sole proprietorship and must offer a developed product or service along with identified marketability.
- b- Their business description must indicate personnel needs and provide a cost statement; the description must also show that the business can finance its operation for at least one year. The required vehicle to present this necessary detail is a well-prepared business plan.
- c- Their business must be a shellfish growing operation.
- d- The expansion of an established business may be considered for participation in the incubator. However, mere relocations from one location in the county to another will not be considered where this results in closing one facility in the area only to relocate to the incubator. Should an existing business applicant be unable to expand in its present location or if it loses its lease through no fault of its own, the Tenant Selection Committee may consider such applications, giving due credit to expansion of product

lines or services or increases in jobs in the local area. Such applications will normally only be considered on a space-available basis.

e- Applicants are considered in accordance with the provisions of Titles VI and VII of the Civil Rights Act of 1964 as amended. Veteran applicants and those with disabilities are encouraged to apply.

4.3 Evaluation Criteria

The criteria used to evaluate prospective clients throughout the application process should be based on the mission and objectives of the incubator and be compatible with the broad mix of growers supported by the incubator.

The Tenant Selection Committee will screen and evaluate the pre-qualification applications based on the criteria below. The Committee will assign priority for consideration based on the following factors:

- Uniqueness of products, product lines, or services
- Product marketability
- Potential for bringing new revenue into Carteret County
- Potential for generating new jobs
- Targeted industry clusters

Suggested basic evaluation criteria include:

- a- The business should be a shellfish growing operation with products and/or services that can be available for sale within three years.
- b- The business must be in early stages of development. Early stage usually means within the first two years of business operations, but small companies involved in a significant change in direction or launching a product may also apply.
- c- The applicant must show ability to pay incubator rents while they develop positive cash flow.
- d- The applicant must want to take advantage of and be able to benefit from the valueadded services and guidance of the incubator.
- e- The applicant must be willing to take advice from the incubator's professional network and/or the Executive Director.
- f- The applicant's business must have the capacity for growth and provision of economic benefits to the area including new job creation and supply chain development.

5. BUSINESS PLAN REQUIREMENTS

Applicants that pass the screening stage will be required to submit a business plan. Applicants needing help preparing a business plan will be referred to the Carteret Community College Small Business Center and the East Carolina University Small Business and Technology Development Center for assistance. Both entities are available to provide one-on-one consulting and evaluation services to the entrepreneurs. The business plan will include, at a minimum:

- A description of the business
- Description of product/service to be provided
- Market analysis to determine real demand for the product/service
- Discussion of marketing strategy and product/service distribution method
- Resume of owner(s) and key personnel
- Projected financial statements for three years
- Identification of equity and borrowing requirements and proof of ability to meet such requirements
- Indication of growth potential
- Indication of number of employees and employment classifications (i.e., skilled, unskilled and managerial)

<u>Final tenant selection</u> will be based on the Tenant Selection Committee's review of the applicants' business plans.

6. TENANT LEASE AGREEMENT TERMS

Selected tenants will enter into an Incubator Participation Agreement, which will define the tenant lease agreement terms:

In accepting admittance to the Shellfish Incubator Program, the tenants will agree to all of the provisions and stipulations of the Program and will agree faithfully to adhere to these provisions in order to receive the benefits of the Program. Failure to comply will result in removal from the Program and full or partial reimbursement to the Incubator for any grants or special expenditures.

The normal incubator period will be for three (3) years from the start of the tenant's residency at the Incubator. At the end of this period, the tenant will be expected to "graduate" from the Incubator and relocate the business operation to an unsubsidized facility. However, should there be no other applicant waiting to enter into a lease agreement with the Incubator, arrangements may be made for the current tenant to remain in the incubator.

The monthly rent will be set on a tiered approach so that smaller growers are not compared to higher yield growers. We propose two rates, one for the low production growers at \$200 a month and high production growers at \$400 a month. The size of the grower will be determined by the quantity of product they process on a weekly basis.

The tenant will enter into a lease agreement with the Incubator for three (3) years under the rental schedule specified above. The rental payments will be specified in the lease agreement. The Incubator will provide common/shared services and facilities to the tenants, including product refrigeration and clean up area.

As part of the application process, the tenant will furnish to the incubator all financial and business plan information, both in corporate capacity, if applicable, and individually, as required for determination of eligibility for participation in the Incubator.

The determination of eligibility will be based on the good faith accuracy of these declarations. Therefore, in the lease agreement, each tenant will represent and warrant that all of the information provided is complete, true, and correct and acknowledge he/she understands that the Incubator will rely upon the accuracy of the information and good faith estimates. Should any inaccuracy or lack of good faith in estimates furnished for the preparation of business plans or in the application be found that adversely affect the tenant's financial standing, or should the tenant's financial circumstances materially change, the Incubator may elect to terminate the tenant's participation in the Program and terminate the lease agreement. The Incubator may hold the tenant personally and individually liable.

6.1 Extension to Incubator Period: Occupancy as a tenant will be initially limited to ten years and will be based on a single three-year lease agreement. In a traditional business incubator tenants are usually expected to graduate from the Incubator within a certain period of time and establish their own independent operation. However, given that this incubator provides services that are otherwise difficult to attain by individual businesses due to high costs (regardless of their maturity level) the tenant lease policy is adapted. Upon approval by the Incubator Tenant Selection Committee, the ten-year lease agreement period may be extended based on space availability on a five-year basis if it is determined that the tenant needs additional time to achieve business plan goals that are necessary to sustain the business outside of the Incubator. If the Committee determines that the additional time will not enhance the ability of the tenant to operate independently of the Incubator Program, the request will not be granted.

The tenant may be required to attend from time to time various training classes or seminars identified by the Incubator and recommended by the Tenant Selection Committee as being advantageous to the tenant as a means of improving his/her business skills.

All tenants must obtain appropriate permits and licenses to operate in designated counties as well as any other state and federal laws.

Each business is responsible for providing its own equipment, supplies, etc., to furnish its respective area.

Tenants will have their monthly utilities (i.e., electricity, trash collection, water) factored into their monthly rental amounts. This amount may be adjusted annually based on service rate changes.

Complaints and issues both 1) concerning the provisions of the lease agreement and 2) not otherwise covered under the provisions of the lease, the grant agreement, or related laws and regulations prescribing complaint procedures for matters relevant to this endeavor, shall be submitted to the Board of directors. The Board will review the facts and circumstances of the

matter and advise the complainant of the decision in a timely manner. Said decision will be considered the final position on the matter.

7. BUSINESS ASSISTANCE POLICY

As described previously, the Tenant Lease Agreement will include requirements for each tenant to seek and accept business assistance from the Director and Incubator partners. This will include expert consultation, mentoring, and guidance from the NC Coastal Federation, CCC, the SBTDC, SBC, SCORE, and other recognized providers.

Tenants are expected to cooperate with assigned mentors, attend and complete recommended and/or required training workshops/seminars to improve business skills and business planning and operations; and network with potential industry contacts, suppliers, customers, and investors.

2. FIVE-YEAR PRO FORMA

Section B2

Five Year Proforma

Proforma Assumptions

- 1- There will be a total of 10 spaces available for rent
- 2- Base rent is reserved for small growers less than 1000 oysters harvested/week
- 3- Tiered rent rate is reserved for growers with over 1000 oysters harvested/week
- 4- Occupancy mix represents the mix of the two volume growers

	Shellfish I	ncubators Fe	asibility Stud	y 5-year Pro f	orma		
						% of sales	industry
Base Rent (low production)	\$200	\$200	\$200	\$200	\$200		
Tiered Rent (high production)	\$400	\$400	\$400	\$400	\$400		
Occupancy %	0.8	1	1	1	1		
Occupancy mix	20/80	20/80	20/80	20/80	20/80		
Availbale spaces	10	10	10	10	10		
	Year 1	Year 2	Year 3	Year 4	Year 5		
REVENUE							
Rent (Month)	\$2,880	\$3,600	\$3,600	\$3,600	\$3,600		
TOTAL REVENUE (YEAR)	\$34,560	\$43,200	\$43,200	\$43,200	\$43,200		
EXPENSES							
Insurance (building)	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000		
Janitorial	\$2,520	\$3,250	\$3,250	\$3,250	\$3,250		
Refrigeration Maintenance	\$9,300	\$9,300	\$9,300	\$9,300	\$9,300		
Maitenance	\$2,500	\$3,150	\$3,300	\$3,500	\$4,000		
Utilities	\$7,200	\$8,000	\$8,150	\$8,300	\$8,500	21%	16%
ED Compensation	\$10,400	\$10,712	\$11,033	\$11,364	\$11,705	30%	10%
TOTAL EXPENSES	\$36,920	\$39,412	\$40,033	\$40,714	\$41,755		
NET INCOME	-\$2,360	\$3,788	\$3,167	\$2,486	\$1,445		
Notes: Salary: 10h/week; \$20/hour - increased 3% year- over year							

ID	Role	County or State
1	Shellfish grower (Experienced)	Carteret
-		New Hanover: Onslow:
2	Shellfish grower (Newer)	Pender
3	Shellfish grower (Experienced)	Carteret
4	Shellfish grower (Experienced)	Pamlico; Carteret
5	Economic development	Dare; Hyde
6	Economic development	Carteret
7	Seafood processor/distributor	Wake
8	Shellfish grower (Newer)	New Hanover; Pender
9	Seed supplier/Nursery manager	Carteret
10	Shellfish grower (Newer)	Carteret
11	Aquaculture incubator director	Maine
12	Shellfish grower (Experienced)	Dare
13	Aquaculture expert	New Hanover
14	Aquaculture expert	Wake; Carteret
15	Aquaculture expert	Louisiana
		Dare; Currituck; Tyrrell;
16	Economic development	Hyde; Washington
17	Shellfish grower (Experienced)	Hyde
18	Shellfish grower (Newer)	Onslow
19	Seafood processor/distributor	Carteret
20	Shellfish distributor	Durham
21	Shellfish grower (Experienced)	Onslow
22	Shellfish grower (Experienced)	Dare
23	Shellfish grower (Experienced)	Carteret
24	Shellfish grower (Experienced)	Pender
25	Shellfish grower (Newer)	Carteret
26	Shellfish grower (Aspiring)	Wake
27	Seafood distributor and retailer	Hyde
28	Economic development	Pender
29	Economic development	Onslow
30	Shellfish grower (Experienced)	Dare
31	Shellfish grower (Aspiring)	Onslow
32	Aquaculture expert	Carteret
33	Shellfish grower (Newer)	Carteret
34	Shellfish grower (Experienced)	Onslow
35	Seafood distributor	NC; SC

Appendix A: Shellfish Mariculture Interviewees

36	Commercial fisher	Dare
37	Aquaculture expert	Carteret



Carteret County, State of North Carolina DOT, Esri, HERE, Garmin, INCREMENT P, USGS, METL/NASA, NGA, EPA, USDA, Carteret County, State of North Carolina DOT, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, Carteret County, State of North Carolina DOT, Esri, HERE, Garmin, INCREMENT P, USGS, METL/NASA, EPA, USDA

Mariculture Investment Map for Onslow County





🖈 Hatchery

Mariculture Investment Map for New Hanover and Pender County





Mariculture Investment Map for Dare and Hyde County





🖈 Hatchery

Appendix C: - Sample Tenant Application Form

NC Shellfish Incubator Application for Admission Information submitted will be held in confidence. **Business name:** Principals and titles: Full addresses: _____Telephone: ______ cell: _____ E-mail: ______ Website_____ Form of ownership: Corporation Partnership Sole Proprietor Nature of business - include a brief description of product/service and nature of market. Submit product brochures and company literature, if available: ______ Brief background of Principal Officer(s); please attach resume: Date Business was established: Company form (C-Corp, S-Corp, LLC, etc.):

Current status or stage of development of Business:
Current sales revenue (dollar volume per month):
Number of employees (include principals): Full-time: Part-time:
Projected number of employees within 12 months:
Type of financing used to operate Business to-date:
BUSINESS PLAN Status of business plan:completed (please attach a copy)in preparation & available by:,,,, not yet started
Would you like help in writing a business plan?YesNo
Space needs:
Other relevant information:
Applicant's name:
Title:
Signature:
Date:

NOTE: Please attach or mail a business plan and/or summary.