Introduction

According to the Island Institute, out of Maine's 5000 miles of coast, only about 20 miles are reserved for the working waterfront. And, out of those 20 miles, just 16 are dedicated to commercial fishing activity. The value of Maine's commercially harvested marine resources to harvesters was valued at $673,910,558 in 2019, with the lobster fishery accounting for 72% of that value at $484,405,036. This amount does not accurately capture the true economic impact of the seafood sector. For lobster alone, it is estimated to contribute more than $1.5 Billion to Maine’s economy. Furthermore, the seafood that comes from our coastal waters and the working communities along Maine’s coast from which it comes drive a large portion of the $6 Billion tourism industry within the state. Imagine what Maine could be if our wild-caught fisheries, aquaculture businesses, fishermen, and sea-farmers, were granted opportunities to diversify their businesses and put more seafood on plates in Maine, the US and across the globe.

With global trade pressures and the impacts of the looming climate crisis on Maine’s most treasured export, the lobster, we need to capture more benefits from this industry. Through diversification of species harvested and markets we can build more resiliency into Maine’s marine resource economy so that the economy is not so reliant on lobster. Seafood is one of the most sustainably grown and harvested foods for human consumption. Compared to other types of food, it is produced with far less environmental impact, and in some cases even improves environmental quality.

The recently completed Economic Development Strategy states that with change comes opportunity. The COVID-19 pandemic coupled with the rapid changes occurring in the marine environment from climate change add up to unprecedented change, but also great opportunities for creating growth resiliency, and sustainability in Maine’s marine resource economy. The state has invested significant effort into understanding the impacts of climate change on our seafood resources and economy through the Coastal and Marine Working group of the Governor’s Climate Council. This work will provide a critical guide in all State efforts on the future of the seafood economy and should be wrapped into any recommendations that emerge from the Economic Recovery Committee.

Changes in technology, Maine’s proximity to 150 million consumers within a 24-hour transport zone and growing global interest in aquaculture and other marine resources suggest an untapped opportunity to grow good jobs and build a forward-looking economy in Maine. Supported by investments in Workforce, Infrastructure and Innovation, Maine’s seafood
economy is poised to attract and retain more workers, pump more money and investments into local economies, and to preserve the working characteristics of our coastal communities that attract millions of tourists (and their dollars) each year. In the 1800’s Maine’s farm sector gave the State the moniker of the ‘Breadbasket of New England’; Our seafood economy, well supported by these efforts, can transform Maine into the “Fish-tote” for New England and beyond for years to come.

What is SEAMaine?

SEAMaine, or the Seafood Economic Accelerator for Maine is an Economic Development Administration funded initiative that brings together a group of industry leaders and committed partners to develop a roadmap for economic growth, workforce development and greater resiliency in Maine’s seafood economy.

Overarching Goals

- Provide support to sustain Maine’s existing marine resource businesses.
- Increase the amount and value of marine living resources originating from Maine’s coastal waters in a way that minimizes the carbon footprint of the marine resource sector, increases competitiveness of Maine businesses, and maximizes resiliency and diversification.
- Support Maine’s coastal communities through preservation and improvement of working waterfronts.

Recommendations to the ERC

Based on outreach to numerous stakeholders, SEAMaine offers the following High Priority recommendations to the ERC.

Infrastructure

Create and fund a Maine Seafood Promotion Council (MSPC).  
(Aligned with Economic Development Plan Action C4)

Between 2009 and 2019 the value of living marine resources has more than doubled while landings (pounds of species harvested) actually decreased over that period. The value increase is attributed to increased marketing efforts and access to export markets. For example in 2010 all of Maine exported 800,000 pounds of lobster to China. The lobster supply glut crisis of 2012 led to the development of high margin export markets. As a result in 2018 the State exported 16 million pounds of lobster to China, a 20-fold increase. During the Pandemic, markets and distribution channels for Maine seafood have collapsed due to restaurant closures and bankruptcies. Prior to COVID 19 Maine seafood was identified as a premium brand. Investments must be made in a national
marketing and consumer education to drive increased sales, recoup and diversify markets. Individual companies that are financially distressed due to COVID 19 do not have the resources to mount marketing efforts. A national marketing campaign to support the Maine Brand and encourage consumers to buy Maine seafood to prepare at home is vital to growing markets, as has been done in the past, and to growing direct-to-consumer sales opportunities for harvesters and farmers. MSPC should be a public/private partnership that is publicly funded but run and managed by private sector seafood marketing professionals. The MSPC should have a board of directors composed of aquaculture and seafood company owners and trade association executives. The MSPC should work in close cooperation with the Maine Lobster Marketing Collaborative, and the Maine International Trade Center.

Amend the statutes that govern the current use taxation program for working waterfront easements.

Current statutes need to be updated to increase the incentives and decrease disincentives to use this working waterfront preservation tool. The current structure is not suitable for the different sizes and scales of working waterfronts across Maine’s coast. Please see the following Report by Maine Coast Fishermen’s Association for details on shortcomings of the program. (also attached as Appendix 3)

Innovation and Entrepreneurship

Increase incentives for private companies to invest in Research and Development.

- Recapitalize the Maine Technology Accelerator Fund MTAF (managed by MTI) to give grants to private marine economy companies (both start-ups and established businesses) that could be used to match private capital used for company expansion and/or product commercialization (Aligned with Economic Development Plan Actions C1 and C3).
- Create funding opportunities to support new product development and assist in the creation of value added products, including both wild caught and aquaculture (Aligned with Economic Development Plan Action C1).
- Raise the investment cap of the Maine Seed Capital Tax Credit Program (Aligned with Economic Development Plan Action C1). The current expanded cap of 15 million is not sufficient for the capital intensive nature of this sector.

Create a program supporting and educating business owners and license holders in accessing government and other resources to support growing their business.

In the last round of Maine Technology Asset funding, 30 proposals came from the seafood sector however only 1 proposal went on to the final round. With increased support, education, counseling and technical support, more members of the industry will have access to programs, tools, and funding that already exist. (Aligned with Economic Development Plan Action C1.)
Talent and Workforce

SEAMaine’s goals are to quantify and characterize the current seafood sector workforce, identifying/quantifying areas of potential growth and barriers to growth in the seafood sector. To continue to grow jobs and maximize the economic return from the marine economy, we recommend the following (Aligned with Economic Development Plan Actions A1-A4 and connected to Actions B1, B2 and B4):

- **Create remote professional and technical education programs.**
  The coronavirus pandemic has brought to light the lack of virtual professional development and education within the marine sector. Given the vastness of the coast line, virtual offerings would also support those in remote and rural areas.

- **Develop occupational standards.** Maintaining current Occupational Standards will be important to understanding and anticipating innovations so the training programs keep current as skills needs evolve. This is also a critical component of any Apprenticeship Program.

- **Advance the findings of the GMRI and MAA Aquaculture Workforce Study and look for synergies across the marine sector.** This well-researched study proposes the establishment of regional vocational aquaculture hubs at Maine Community Colleges and Career Technical Education Centers, a formal Aquaculture Apprenticeship program through the Maine Department of Labor, and development of Occupational Standards by industry. The 9-page Summary and Full Report can be downloaded here.

- **Market careers and training opportunities in the marine economy and profile the variety of soft and hard skills, including an innovation mindset, needed across this dynamic and fast-evolving sector.** New technologies are opening up more opportunity in the blue economy and the workforce in Maine should be at the forefront of this revolution. Investment in workforce skills for (1) emerging industries, such as Recirculating Aquaculture Systems, offshore aquaculture/wind, ecosystem remediation, large aquaponic systems, climate resilient species) and (2) value added processing jobs (retort canning, High Pressure Processing, seaweed drying). processing for nutraceuticals) would help catalyze investment while also sustaining good jobs in the state. Partnerships with municipalities & Chambers of Commerce may also be seen as an employee benefit and opportunity to extend the reach.

**Expand and simplify the Education Opportunity Tax credit program** (Aligned with Economic Development Plan Actions B3).
This tax credit program can attract young, well trained talent to Maine’s seafood sector.
Cross Sector Recommendations

The following recommendations benefit many sectors of Maine’s economy in addition to the great benefit they provide to the seafood sector.

Infrastructure

Invest in 3 phase power along the coast (Aligned with intent of Economic Development Plan Actions D1-D3.)

3-phase power is critical for the operation of Maine’s marine living resource economy and many seafood businesses, from aquaculture hatcheries to lobster wharfs and seafood processing operations. This investment will address power outages that expose the vulnerabilities across the sector that hinder business growth and development, especially in rural areas where such growth is needed.

ConnectME infrastructure grants (Aligned with Economic Development Plan Action D3).

Access to high-speed internet is critical for the development of any business along the coast including those within the seafood sector. Continued and deepened state level support should be directed to ensure that all Mainer shave access to high-speed internet.

Conclusion

Along Maine’s coast, seafood and the working waterfront is the scaffolding that supports our communities. In a city like Portland, the working waterfront draws tourists from around the globe who come for the views, the seafood, and the culture. In rural communities, seafood is one of the few opportunities for a job that can support a family. It’s imperative that we recognize Maine’s fishing heritage and embrace the opportunities it presents us while planning for Maine’s future. On behalf of SEAMaine, we offer this report, not as a list of recommendations that we lay at the feet of the ERC and then walk away, but as a plan that we stand ready to partner with the State to see put into action. It is our hope that SEAMaine and partner organizations can partner with the ERC and appropriate State agencies to make actionable all recommendations contained within this report.

Respectfully submitted on behalf of SEAMaine,

Bill Mook, Mook Sea Farm
SEAMaine Co-chair

Curt Brown, Ready Seafood
SEAMaine Co-chair
List of Appendices:

Appendix 1: Letter from Maine Aquaculture Association with Specific Aquaculture Recommendations

Appendix 2: Letter from Maine Coast Fishermen’s Association with Specific Recommendations

Appendix 3: State of Maine’s Working Waterfront Report - Maine Coast Fishermen’s Association

Appendix 4: Maine Aquaculture Workforce Development Strategy- Maine Aquaculture Association and Gulf of Maine Research Institute
BACKGROUND: The Maine aquaculture sector employs over 700 people year-round and generates over $100 million in farm gate sales annually. The states aquaculture sector is one of the most diverse in the country growing fish, shellfish and sea-vegetables, using multiple production methods in both fresh and salt water on land and at sea. For over 45 years the Maine Aquaculture Association (MAA) has represented the interests of commercial aquaculturalists at local, state, federal and international levels.

In May 2020, the MAA was asked to document the impact of the COVID-19 on the aquaculture sector. On June 4 MAA submitted the attached memo that summarized the situation at that time. On August 19 MAA was asked to gather feedback from the aquaculture sector on the Governors ten-year Economic Development Strategy released in November 2019. Unlike the June exercise that was based on statewide and national surveys and due to the short turnaround time, MAA chose to do a targeted series of phone interviews with growers who were representative of the diversity in the sector. Over 4 days MAA conducted 48 phone interviews. Interviewees included mussel, oyster, kelp, salmon, marine ornamental, and baitfish growers. Both large and small companies were interviewed. Interviewees included companies that used bottom and suspended culture methods and landbased hatchery and tank farms. Several infrastructure companies that provide goods and services to the aquaculture sector were also interviewed. Interviews consisted of a short series of standardized questions and a freer ranging discussion around the sector, the challenges it is currently facing and what solutions growers would propose in order to stabilize and recover the sector. Finally, growers were also asked to assume that the COVID 19 situation was resolved and give suggestions for specific actions that could stimulate growth in the sector. All interviews were confidential to allow interviewees to be frank. The below results summarize the key findings.

COVID 19 Impacts.
100% of interviewees continue to report some form of impact on their business by COVID 19. Impacts include, price declines, market contractions and distribution chain disruptions, increased operational costs and lack of available labor. Some moderate recover in market demand was reported however all interviewees reported significant year on year revenue declines.

Governors Economic Development Strategy.
1. Most growers had heard of the Governors Economic Development Strategy, few had read it.

2. Those growers that had read the Strategy (n =9) generally thought the vision and goals were good but that the strategy lacked enough specific action items to achieve the strategy it outlined. It was also noted that it lacked metrics to assess the efficacy of those strategies. Several interviewees suggested that the lack of budgets and specific assignations of responsibility for strategy implementation called into question whether the document would be effective.
3. Of the growers that had not read the document (n=39,) when the core components of the strategy were outlined most agreed that “talent and innovation” were important components of a growth strategy but many suggested that there were more important factors constraining the growth of the aquaculture sector. Some of those factors were; lack of staff and resources at DMR to process lease applications in a timely manner, lack of risk management tools that would assist growers survival through bad market times, lack of a coordinated Maine Seafood marketing effort, significant barriers to entry for small growers, lack of coordination between state regulatory and economic development agencies and a lack of advocacy within state agencies for the sector.

4. Many interviewees suggested that the Development Strategy should be converted into an Economic Development Plan that included specific action items associated with business and investment attraction. The Plan should be sector specific, include budgets and identify what departments and staff would be responsible for implementing the plan.

Additional Medium term needs and suggested fixes:

**Talent and Workforce:**

1. Invest in specialized aquaculture workforce development and training programs.

Focus Maine in cooperation with the Gulf of Maine Research Institute and the MAA recently commissioned an aquaculture workforce needs assessment. Fund and Implement the report’s recommendations. The ERC should support establishment of regional vocational aquaculture hubs at Maine Community Colleges and Career Technical Education Centers (9-12 vocational high schools), a formal Aquaculture Apprenticeship program through the Maine Department of Labor, and development of Occupational Standards by MAA.

2. Invest in University of Maine aquaculture faculty positions in the Aquaculture Research Institute.

Over the last 20 years the University has shifted key aquaculture faculty positions to general marine sciences positions. As a result, while the state has invested millions of dollars in aquaculture R&D facilities the University lacks aquaculture faculty expertise in core competencies such as aquatic animal nutrition, aquatic plant disease, aquaculture engineering, aquatic farm management, production economics, and finfish genetics.

3. Expand and simplify the education opportunity Tax credit program (Strategy B3).

**Innovation and Entrepreneurship:**

1. Create and fund a Maine Seafood Promotion Council (MSPC).

Markets and distribution channels for Maine seafood have collapsed due to restaurant closures and bankruptcies. Prior to COVID 19 Maine seafood was identified as a premium brand. Investments must be made in marketing and consumer education to drive increased sales, recoup and diversify markets. Individual companies that are financially distressed due to COVID 19 do not have the resources to mount marketing efforts. A marketing campaign to support the Maine Brand and encourage consumers to buy Maine seafood to prepare at home is vital to support direct to consumer sales efforts by farmers. MSPC should be a public/private partnership that is publicly funded but run and managed by private sector seafood marketing professionals. The MSPC should have a board of directors comprised of aquaculture and seafood company owners and trade association executives. The MSPC should work in close cooperation with the Maine Lobster Marketing Collaborative.
2. Create and fund a grant program designed to support farmers developing direct to consumer sales platforms.

Less than 20% of seafood is consumed at home. Traditional distribution channels are long, complicated and involve numerous middlemen driving price up and quality down. New direct to consumer distribution methods are expensive to develop and implement. Farmers need capital, technical assistance and marketing support to develop these new distribution channels that will be more resilient and allow farmers to capture more of the value chain.

3. Increase incentives for private companies to invest in Research and Development.

Raise the investment cap of the Maine Seed Capital Tax Credit Program (Action C2 in Economic Development Strategy). Recapitalize the Marine Technology Accelerator Fund MTAF (managed by MTI) to give grants to private marine economy companies that could be used to match private capital used for company expansion and/or product commercialization.

4. Create a technology transfer program to assist Maine aquaculture businesses acquire intellectual property and technology from other production areas.

Other countries and states are ahead of Maine in terms of production methods and sector development. Direct technology transfer missions for aquaculture business owners would accelerate the competitiveness of the Maine Aquaculture sector.

5. Create and fund the Maine Center for Seafood Innovation (MCSI).

The MCSI should be collocated with the Aquaculture Research Institute at the University of Maine. MCSI should be staffed by engineering and food science faculty and focus on the development of automated seafood processing equipment and novel seafood value added products.

**Infrastructure:**

1. “Staff Up” DMR and reinvigorate its aquaculture division to enable the timely processing of lease applications.

Currently the division is down 2 FTE including the division director. Lease applications are up, and lease processing time has increased significantly due to staffing constraints and COVID 19 social distancing requirements. If the situation is not resolved an entire growing season will be lost and sector growth will stop. DMR must begin conducting virtual aquaculture lease hearings immediately. DMR must assign full time lease hearings officers to the aquaculture leasing program. Current hearings officers are ½ time and a lack of full-time focused staff is slowing down lease application review and decisions.

2. DEP must accelerate the permitting of landbased aquaculture farms.

Maine has 4 proposed landbased finfish farms in the permitting process. Once constructed these farms will employ roughly 100 people. During construction they will employ an additional 350 workers. Permitting has taken 2.5 years already and should be fast tracked.
3. Increase funding for Small Harbor Improvement Program (SHIPS).

Public commercial wharf access is a critical bottleneck in downeast Maine. Commercial fishermen and aquaculturalists must often steam miles to unload their products. SHIPS program should be increased and downeast region should be prioritized.

4. Create a grant program to support construction of cold storage facilities.

Seafood is highly perishable. Maine lacks enough cold storage capacity and capacity it has is often not in the right place. Public matching funds to support the construction of cold storage facilities would stimulate private investment in new capacity.

5. Recapitalize the Working Waterfront Preservation Program (WWPP).

Maine is losing working waterfront properties through conversion to high priced residential development. WWPP has saved key working waterfront properties through an easement program but the program is undercapitalized. New funds would allow the program to continue to save working waterfront properties that provide vital access for commercial use along the coast.

6. Amend the statutes that govern the current use taxation program for working waterfront easements.

Current statutes need to be updated to increase the incentive and decrease disincentives to use this working waterfront preservation tool.

7. Amend the aquaculture leasing statutes to give aquaculture equal status to other user groups.

Current statutes mandate that any other marine resource user group be given precedence over an aquaculture lease applicant. Statutes should be amended to give lease applicants equal status to other user groups. Leasing decisions should include a review of the economic activity currently generated by the area being considered for a lease site compared to the economic activity resulting if the lease is granted.

8. Create and fund a full-time aquaculture specialist position at DECD.

Currently all state employees specializing in aquaculture are regulatory. Aquaculture is a highly technical and specialized business sector. DECD should hire an aquaculture business development specialist to assist investors navigate the states permitting processes and help potential investors understand what state and federal programs are available and designed to stimulate development in the sector.

9. Increase funding for ConnectME infrastructure grants (strategyD3).

10. Shift all aquaculture lease and permit applications to online, semi-automated application portal (strategy F2).
FEDERAL LEVEL FIXES:

1. Payroll support: Extend federal PPP for an additional 12 weeks.
   
   With sales expected to remain dramatically lower than normal due to depressed restaurant sales, farms' cash flow and ability to hire and pay workers remains critically low during the busiest production season.

2. Amend the New Markets Tax Credit (NMTC) Program to allow aquaculture projects as a qualified investment.

Currently aquaculture projects do not qualify for NMTC although agricultural projects do. NMTC qualification would free up significant private capital to invest in areas of Maine that are rural and economically challenged.

3. CARES ACT Reboot

   • Simplify application, act faster, pay directly. Section 12005 Assistance to Fishery Participants

   • Increase funding. Send payments directly to farms. Eliminate the 35% loss requirement. Include salmonid farms

   • Paycheck Protection Program Increase funding. Send payments directly to farms. Eliminate the 35% loss requirement. Lengthen the period of time covered. Include input costs (i.e., shellfish seed, fish fry/fingerlings) and include these costs in loan portion that is forgivable. Provide subsidies to employers for employee benefits when a farm or business maintains payroll.

4. USDA CFAP Reboot

   Increase funding. Send payments directly to farms. Eliminate the price reduction requirement and/or allow reduced sales as proxy for price reduction. Lengthen the period of time considered for price reduction documentation to allow inclusion of same time period in years prior to COVID-19 outbreak. Provide subsidies to employers for employee benefits when a farm or business maintains payroll. Include shellfish and seaweed in the program

5. Additional Forms of Economic Assistance

   • Create additional low or no interest loans and lines of credit for producers.

   • Guarantee commercial lenders lines of credit so that they are not peremptorily canceled during pandemics or similar market disruptions

   • Link federal loan guarantee programs to loan repayment deferral program until crops are harvested and sold.

   • Add aquaculture products to federal purchase programs for unmarketable crops (lack of market or unmarketable because of product size).

   • Create grants to support farms expanding into direct marketing (i.e., purchase of storage and transportation capacities, online direct sales platforms).

   • Create interruption of business insurance subsidy for pandemics and similar market disruptions.

   • Purchase unmarketable live shellfish and fish for public restocking or stock enhancement programs.

   • Include aquaculture crops into USDA specialty crop programs.

   • Fast-track the Aquaculture Organic Label rule to expand and diversify the market.

   • Add fish and shellfish to the FSA Livestock Indemnification Program.

   • Develop a program similar to the export credit insurance to protect a farmer against the risk of non-payment by domestic or foreign buyers that may not be fully stable after the pandemic.

   • Modify the USDA Whole Farm Revenue insurance program to allow for catastrophic market impacts associated with pandemics
To: Manufacturing and Natural Resources-Based Industries Subcommittee of the Governor’s Economic Recovery Committee

8.26.2020

The Maine Coast Fishermen’s Association (MCFA) works to identify and foster ways to restore the fisheries of the Gulf of Maine and sustain Maine’s iconic fishing communities for future generations. Established and run by Maine fishermen, the objectives of the Association are to provide a voice for our fishing communities, to rebuild the Gulf of Maine ecosystem, and to support diverse fishing businesses throughout Maine. The COVID-19 Pandemic and economic crisis have revealed the weaknesses in our economy and food system. As such, now is the ideal time to reflect on the Economic Development Strategy, update it as appropriate with new information, risks, and opportunities, and build an updated plan that embraces our new reality. Maine’s seafood and fishing industries should be prioritized as part of that opportunity, and we submit these comments and recommendations in the hope that we can propel Maine into a more stable, diverse, and healthy future together.

The recently completed Economic Development Strategy states that with change comes opportunity. We are in the middle of one of the most extreme and impactful changes we will experience in our lifetime, and we believe that Maine’s marine resources, specifically our wild-caught fisheries, embody the opportunity that the pandemic has illuminated. While close to 80% of our national seafood consumption takes place in restaurants, because those restaurants are closed, we have witnessed a massive increase in seafood sales at local seafood markets in Maine and around the country. Anecdotally, we have been told that in Maine, seafood sales at retail stores increased as much as 100% for some businesses. Additionally, we have seen a significant increase in “direct to consumer” sales for fishermen, and new small-scale seafood sellers who are working directly with fishermen to connect them with consumers and garner a higher price for a fresher and storied product. The extent of these changes may change once we are collectively allowed to dine at restaurants again but new skills, demand, and habits are being formed, and Maine can embrace that opportunity as a state known for its premium seafood.

We are disappointed that wild-caught seafood was not a larger part of the Strategy, and that instead aquaculture is upheld as the solution to diversifying fisheries. While we fully support aquaculture and the prospects that the industry presents, we worry that by focusing on this as a solution while negating opportunities in the wild-caught fisheries, that Maine’s commercial fishermen will find themselves irrelevant in the future. Lobster is the most prominent of our wild seafood products but we have amazing opportunities in groundfish, scallop, tuna, shellfish, and lesser known species like monkfish and we hope that Maine will update the Economic Development Strategy to incorporate the entirety of Maine’s seafood bounty.

Maine’s diverse fishing industry is arguably one of Maine’s greatest competitive advantages. Seafood is sustainable, healthy, and boasts one of the lowest carbon footprints of any other animal protein. The pandemic has revealed a potential for seafood industry growth as more consumers seek out healthy, sustainable, safe food options.
To support Maine’s fishermen, support sustainable fisheries, and promote consumption of more Maine seafood, we ask that the following priorities be taken into consideration:

**Innovation and Entrepreneurship**

1. Create programs and provide funding sources that incentivize investment and innovation in the seafood supply chain and value-added product development.
2. Create a grant program and resources that support fishermen interested in direct to consumer sales.
3. Create a low-interest revolving loan fund to allow fishermen to diversify businesses through the purchase of permits and gear.

**Infrastructure**

1. Invest in Maine's working waterfront.
   a. Fund the Working Waterfront Access Program through the Lands for Maine’s Future.
   b. Create an additional fund that better reflects the needs of smaller or discrete working waterfronts in Maine.
   c. Create a low-interest revolving loan fund that will allow working waterfront businesses access to capital to innovate, adapt, invest, and update our infrastructure. Currently, due to flood insurance costs, most working waterfront properties are unable to take out loans from traditional lenders at affordable rates.
2. Assess the gaps in Maine’s food system infrastructure including processing, cold storage, and distribution for seafood, and create a plan to invest significant funding and resources to better prepare for the future and next pandemic.
3. Prioritize Maine LANDED seafood as opposed to the current ambiguous categorization of local which includes “products of Maine”.
4. Understand the cultural and social impacts of climate change in Maine’s coastal communities and create systems that allow fishermen and coastal community members to be supported while adapting. This includes resources for fishermen coping with mental health concerns such as depression and anxiety caused by both uncertainty and climate change impacts to their businesses.
5. The Portland Fish Pier and Portland Fish Exchange represent huge untapped opportunities for both food and tourism. The Fish Pier Authority is currently going through a strategic planning process which has been interrupted due to COVID-19. Maine should be more involved in that project as the Portland Fish Pier represents some of the most important and valuable working waterfront in the state.
6. Support stewardship-focused policies at the New England Fishery Management Council and Atlantic States Marine Fisheries Commission to ensure the Gulf of Maine has healthy fish stocks to maintain Maine’s seafood opportunity.

**Talent/Workforce**

1. Support the next generation of Maine fishermen and create a fishing apprentice program that supports fishermen willing to take on an apprentice, and identify resources that help build businesses plans and access to flexible capital to invest and grow new Maine businesses.
2. Create or invest in entrepreneurship programs focused on seafood innovation.

Along Maine’s coast, seafood and the working waterfront is the scaffolding that supports our communities. In a city like Portland, the working waterfront draws tourists from around the globe who come for the views, the seafood, and the culture. In rural communities, seafood is one of the few opportunities for a job that can support a family. It’s imperative that we
recognize Maine’s fishing heritage and embrace the opportunities it presents us while planning for Maine’s future.

Thank you for your time and consideration. I will be happy to follow up on any of our recommendations if that would be helpful.

Sincerely,

[Signature]

Ben Martens
Executive Director

Cc’ Governor Mills, Commissioner Keliher
The State of Maine’s Working Waterfront

March 2020

Monique Coombs

Maine Coast Fishermen’s Association
About MCFA & This Report

The Maine Coast Fishermen’s Association (MCFA) is an industry-driven non-profit working to restore the fisheries in the Gulf of Maine and sustain Maine’s fishing communities for future generations. The organization was started in 2006 by fishermen from Port Clyde with the goal of improving fisheries management to better serve Midcoast Maine’s inshore fishermen. The organization’s founding members, fishermen who spent their lives on the water, created the organization to amplify their voices in fisheries policy, and most importantly, to protect their communities and way of life. Since its founding the organization has expanded far beyond Port Clyde, from the edge of New Hampshire to the Canadian border, and continues to work with fishermen from a variety of fisheries including groundfish, shrimp, lobster, bluefin tuna, herring, whiting, menhaden, monkfish, and scallops. Through our work, MCFA has spent endless hours in Maine’s iconic fishing communities and learned about the concerns and obstacles many fishermen are facing, including access to the waterfront for them to conduct business.

In 2017, Portland fishermen became increasingly concerned about a rezoning proposal slated for a wharf within the waterfront central zone of Commercial St. There was uncertainty whether the development posed any immediate threats to the fishermen and their businesses, but it unquestionably heightened concerns about potential future developments and increased the speculative value of waterfront properties in the area. Fishermen were also worried that their daily routines might be threatened by competitive businesses that were less understanding of the daily activity of commercial fishing. The Fishermen’s Association supported the efforts of Portland fishermen to stop the proposed development from being built on the water and began efforts to advocate on behalf of commercial fishermen for resources and awareness of Maine’s working waterfront.

With the spotlight on Portland’s working waterfront, it quickly became apparent that other coastal communities and fishing businesses were also worried about changes happening on the waterfront and that it was time to further investigate the current status of the working waterfront for commercial fishing activity. In the past Maine has had an active Working Waterfront Coalition with more than 150 members, led by Maine Sea Grant, Coastal Enterprises, Inc. and the Island Institute, and the last significant published report on working waterfront access was the Island Institute’s The Last 20 Miles in 2009.

With generous support from Ram Island and other Maine Community Foundation donors, the Maine Coast Fishermen’s Association was able to spend six months, from April – September 2019, visiting communities along the coast to examine the current status of infrastructure and hear concerns about the future of Maine’s working waterfront. This report shares information accumulated from interviews, conversations, meetings, and research to help elevate the value and attention paid to working waterfronts for commercial fishing and provide suggestions for next steps. It also provides initial criteria that could be used to evaluate working waterfront sites that may be most vulnerable. We hope it sparks new conversations and continues to shine a light on the needs of Maine’s commercial fishing communities.
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Executive Summary

Working waterfronts are more than just a place of business for commercial fishermen; they are a hub of information, a collection of salty characters, a safe haven, a meeting room, a space for support, and they are well-deserving of both a place in Maine’s history and its future. Communities along Maine’s rocky coast are home to large wharves that bring millions of pounds of lobster over the dock to much smaller wharves that are used by one or two fishermen to store and maintain gear. They are in various stages of repair with some being “top of the line” while many others are in need of new planks and pilings. They are all necessary for fishing activity, to access the water, and most importantly to return home to after a day, or many days, at sea. Commercial fishermen are dependent upon safe, stable, reliable, and accessible working waterfronts for numerous aspects of their lives. But Maine’s working waterfronts are increasingly fragile due to the many challenges facing the commercial fishing industry, changes to Maine’s economy and culture, and the warming climate.

This report serves to update our collective knowledge and inform future steps for the protection and preservation of Maine’s working waterfront from the lens of the commercial fishing industry. Our research included one-on-one interviews, literary research, and feedback from a broad group of advisors. While we were able to learn directly from just 10 of Maine’s coastal communities, the lessons are applicable along the coast.

Commercial fishermen and coastal municipalities continue to feel working waterfronts are extremely vulnerable to development pressure and to the future impacts of climate change and sea level rise. Although there are a few state programs available to preserve and protect Maine working waterfront infrastructure, these programs have not been able to address the breadth and scope of working waterfront challenges. There are very few opportunities for funding for commercial fishing businesses on the working waterfront and some of these funding opportunities are extended to a variety of marine-dependent uses that require waterfront access, such as marinas and boatyards; it is often difficult for commercial fishing businesses to compete with these much larger businesses.

Maine’s working waterfront is a collection of public and private infrastructure and both were identified as in need of repair and protection. But the definition of working waterfront infrastructure used by commercial fishermen went beyond wharves and piers and included adjacent land essential for parking and gear storage. Discrete working waterfronts, those small piers or wharves that dot the coast and are used by one or two fishermen, were noted as especially fragile and often overlooked. Specific criteria for identifying at-risk properties can include the utility of the property for commercial fishing businesses, economic and community significance of the property, level of threat of conversion, and ability to combat and adapt to climate change.

Public understanding and appreciation for the work along Maine’s coast continues to demand attention to diffuse conflict and celebrate the value of working waterfronts to coastal communities. Specific educational efforts targeted at current and future waterfront property owners within coastal communities were identified as an important tool. Signage on working waterfront properties to celebrate and highlight their culture, history, tradition, and economic contribution to the community may also be of benefit. Coastal communities continue to use their comprehensive plans and ordinances to protect working waterfront properties with varying degrees of success. Of note, municipal harbormasters are on the front lines of working
waterfront issues and will need to play an increasing role in conflict resolution as competing uses for waterfront access increase.

This report provides a snapshot of Maine working waterfronts focusing specifically on the commercial fishing industry. It includes suggestions for a path forward that aim to protect the working waterfront and encourage investment in the working waterfront, commercial fishing businesses, and fishermen. Through collaboration, innovative thinking, and a holistic examination of the working waterfront, Maine can ensure a thriving future for its fishing and seafood businesses. We can also do this by creating opportunities that allow fishing businesses to more fairly and aggressively compete with new development; aid them in enduring environmental changes; assistance that allows fishermen to cope with new policy, regulation, quota, and management; and mental health resources that humanize the industry and benefit fishermen-wellbeing. While commercial fishing businesses and Maine seafood are important to the state’s economy, Maine fishermen are the most important and biggest asset. Ensuring a future with robust working waterfronts helps keep our coastal communities strong and Maine fishermen and their businesses prospering and healthy.
Methodology

A diverse group of organizations, fishermen, and businesses served as advisors for this project. The advisory group was used to share information, discuss ideas, select key coastal communities to interview, and vet the process and the findings for this work. The group met twice over the six-month process and the investigator met with each member individually either in-person or on the phone throughout the project.

Most of the information gathered was done in-person or on the phone via informal meetings and interviews. The communities that were used as focal points for the information gathering were Portland, Harpswell, Boothbay Harbor, St. George, Surry, Stonington, Milbridge, Cutler and Jonesport. These communities were chosen based on geography and inclusion in past reports. Communities were also selected based on their diverse fisheries, populations, and differing social landscapes such as year-round residency and tourism. As an example, very little fishing occurs out of Surry, but numerous fishermen have moved from Stonington to Surry seeking less expensive housing and a better school system.

Over sixty interviews were conducted during a 6-month period with fishermen, town staff, town selectmen, and community members, with most interviews and meetings held with fishermen. Past reports were reviewed in order to identify work that has already been done, data that can be compared, and any trends that are consistent throughout the reports. A list of previous working waterfront plans and reports is in Appendix a. Surveys were also shared and gathered online and at the 2019 Maine Fishermen’s Forum. Information gathered from the surveys was used to guide interviews and provide suggestions for things that should be further investigated. Appendix b provides the questions that were used to frame interviews.

While staff capacity did limit the amount of time for research and travel, many of the interviews and information revealed that the themes explored in this report are applicable to most of Maine’s coastal communities. Throughout the report, we noted lessons learned and specific tools that communities shared to address an issue. The “path forward” section contains suggestions that are founded in models from other industries and vetted via the interview process and other communications.

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Defining working waterfront

Working waterfront is often described as something that provides access to the water such as wharves or piers and is utilized for both recreation as well as commercial activities including aquaculture. It also pertains to marinas, boatyards, and other marine-related businesses that are reliant on waterfront for business activity. While this more general definition of working waterfront is inclusive of the many activities and businesses that require waterfront access, the interviews and research done for this report are specific to the working waterfront for commercial fishing activity. Therefore, for the remainder of this report, working waterfront refers to working waterfront specific to commercial fishing businesses.
A Path Forward

The working waterfront is a hub of activity and an economic driver for many of Maine’s coastal communities. A vibrant working waterfront requires healthy fishing businesses, safe infrastructure, supportive communities, and a strong plan to prepare for a changing climate. The following recommendations are a culmination of suggestions and ideas extracted from conversations, interviews, and previous reports to stimulate thinking about a path forward to sustain Maine’s working waterfront. The overall feasibility and details of these ideas have not been fully vetted and will require further research.

These recommendations are designed to create proactive, positive, and solution-based suggestions that may be carried out by Maine’s nonprofit community, university extension programs, or state and local governments in order to plan for a future that includes a thriving working waterfront in Maine’s coastal communities.

Celebrate the Uniqueness of Working Waterfront Communities

- Engage stakeholders in working waterfront communities to understand each other’s values. Create a “Care and Maintenance of Coastal Maine Guide” for use by coastal communities. Harpswell, Moosabec, and Stonington have all had iterations of guides that were made available to real estate businesses, renters, new residents, general stores, libraries, and other local businesses, to share information about the sights, sounds, smells, and even tastes associated with living in a fishing community. These guides, created by Maine Sea Grant (Harpswell and Moosabec) and the Town of Stonington, utilized the senses, stories, and photos of the waterfront to share with people unfamiliar with fishing activity. They explained why some of these activities occurred in order to both celebrate fishing as well as mitigate future conflict because of uncertainty and a lack of understanding.

A new iteration should include information pertaining to living near the water such as ordinances that are important for ocean health like those that relate to septic system maintenance, pesticide-use and shoreland zoning; and, information about sea-level rise, storm surges, and flood zones/FEMA. Creating a holistic guide that includes commercial fishing activity alongside ocean health and necessary maintenance for homes by the water would help communities plan for a future that includes commercial fishing and a healthy working waterfront.

- Design creative new ways to highlight preserved working waterfront properties to raise awareness and celebrate the economic, environmental, and cultural values of Maine’s working water fronts. For example, farmland that has been protected can enroll in programs such as the Forever Farm campaign from Maine Farmland Trust. A similar outreach campaign could be developed for working waterfront properties and include stories from fishermen about their culture, history, tradition, and economic contribution to the community. Creating outreach and content that can be shared via a website or newsletter will help convey the importance of Maine’s working water fronts to coastal residents and visitors.
Protect Vulnerable Working Waterfront Infrastructure

- Explore other funding opportunities to protect at-risk working waterfront properties including programs that are not reliant upon the state for funding or oversight. These may include grant programs, low-interest rate programs or other investment capital. Funding for traditional programs such as the Working Waterfront Access Protection Program (WWAPP) through the Land for Maine’s Future Program should also be continued.

- Infrastructure beyond piers and wharfs should be considered for protection. Adjacent land for parking, gear storage, and other water dependent needs are equally important to consider. For example, discrete working waterfronts may be of focus as they are often outside of the scope of usual funding opportunities and especially vulnerable to climate change and sea-level rise. (Discrete working waterfronts are described later in the report under Economic Vitality.)

- Develop and refine criteria for measuring and prioritizing working waterfront properties. Suggestions for criteria for evaluation can be found in Appendix d. and include criteria such as utility of the property for commercial fishing businesses, economic and community significance of the property, level of threat of conversion, and the ability to combat and adapt to climate change.

Document Information and Data about the Status of Maine’s Working Waterfront

- Continuously assess the status of working waterfronts to inform decision-making. Create a method to continuously evaluate the health of Maine’s working waterfront. This will make it easier to update reports like the Island Institute’s The Last 20 Miles, understand solutions that succeed and those that fail, and prioritize areas that are most vulnerable to loss whether due to development or climate change. A platform for continuous evaluation would also create a clearinghouse for how properties are being used and where pressure is of most significance due to increasing tourism, summer residents, and an aging and changing year-round population. Identifying a few specific, easily replicable metrics to start will help create a foundation for this process. These metrics should be identified by an ad hoc partnership of organizations involved with working waterfront issues (i.e. Maine Sea Grant, Island Institute, Island Institute, Island Institute, Island Institute, Island Institute).

In October of 2018, Boothbay Harbor's Working Waterfront was named by Maine Preservation as one of Maine’s most endangered places. The threat to Boothbay Harbor’s working waterfront that is identified by Maine Preservation is applicable to most of Maine’s coastal communities: A study by the Maine State Planning Office states that by 2050 most of Maine’s coast will be classified as Suburban/Urban due to economic pressures inducing communities to shift to non-maritime commercial and residential uses. Only eight of the 20 miles of working waterfront are owned and dedicated to use by the public; the remaining 12 miles are privately owned and vulnerable to changing uses. At any point this land could be developed for hotels, or other commercial or residential uses, permanently removing access for commercial fishermen. The organization also points to appropriate zoning and funding as integral to preserving the working waterfront.
Coastal Enterprises, Inc., Maine Coast Fishermen’s Association) along with state and municipal governments and community stakeholders to design a realistic and efficient approach.

- **Document the impact of climate change to Maine’s working waterfront infrastructure.** Fishermen are on the frontlines of a changing ocean and should be encouraged to document and photograph their wharves during each season, after storm-surge, and at king tides. Communities such as Harpswell are using this type of documentation to record the impact of sea-level rise and storm surges on roads that are most vulnerable to sea-level rise. These images can be used to not only illustrate visually the change in working waterfront infrastructure over time, but also to seek funding for improvements in the future.

**Key Findings**

**ECONOMIC VITALITY**

Most commercial fishermen who responded to the written survey perceive access to the working waterfront as a problem for them to conduct their business. When asked what the working waterfront means to them, fishermen often included aspects such as bait, trucking, fuel, ice, and other means that allow them to operate their business whether on or off the water. Therefore, it is important to consider the overall economic impacts on commercial fishing businesses when planning for the future of the working waterfront. As one fisherman mentioned in an interview, “If my wharf is failing or I need to sell it’s because my entire business is failing.”

Commercial fishing businesses need to have opportunities and resources to fairly compete with new and modern developments that are vying for waterfront space, access, and views. Competition and development were identified as looming threats in every interview with fishermen. Their concerns were specific to things such as increasing property values, aquaculture, offshore development, and competition from non-commercial use on public boat landings specifically in the warmer months by recreational boaters.

According to the Island Insitute’s *The Last 20 Miles* from 2009, there are approximately 16-miles of working waterfront for commercial fishing. The report assumes 100-ft per access point, and of the 1,555 working waterfront points identified, only 888 provide access that supports commercial fishing activities, or just over 16-miles. Of those 888 points, only 62 provide what they consider “prime working waterfront” which includes all-tide access, adequate parking, and on-site fuel for commercial fishing businesses, or just over one mile.
Private & Public Infrastructure

In both interviews and surveys, a combination of private and public working waterfront areas were identified by fishermen as spaces that they were concerned about risk for conversion, disrepair, and conflicting use, but it is difficult to determine the magnitude of risk without further investigation. The cost of working on the waterfront is increasing as more recreational boaters seek berthing space. One fisherman from Yarmouth was frustrated that his dock space went up “400%” in the previous year because he is now also competing with the cost that high-end boaters are willing to pay for slips.

Below are the properties and communities that were specifically named in the surveys that warrant further investigation.

- Chebeague Island Stone Pier
- Spruce Head
- Boothbay Harbor Carter’s Wharf
- Scarborough, Pine Point
- Cape Elizabeth, Kettle Cove State Park
- Portland
- Royal River
- Little John Island
- South Freeport
- Orr’s Island
- Orland
- Seal Cove
- Bar Harbor

Public spaces are concerning to commercial fishermen and municipalities because their use fluctuates throughout the year, being most utilized during the summer months. Public boat landings can be extremely crowded and a source of frustration for commercial fishermen trying to gain access to the ocean. Because municipalities own them, funding to repair and maintain these spaces is often limited.

In contrast, there are a handful of wharves in Downeast communities such as Stonington that have invested heavily in upgrades to accommodate record-breaking lobster landings. Some fear these communities may have overextended themselves. If recent higher landings and prices fall, there’s concern that wharves in these communities may not be able to maintain their upkeep and/or that it will be too costly for them to adapt their infrastructure to cater to other fisheries besides lobster.

Lessons learned

- Pine Point in Scarborough applied for and received funding from the Working Waterfront Access Protection Program (WWAPP) to protect commercial fishing access.

“I was talking to the owner yesterday and he said that the real estate hawks have been watching his business which contracts he keeps/losing, and they show up the day he loses a contract, say they know he’s going through hard times, and will offer him a buyout. He is getting old, late 70s but still fishes. If he ever has to sell, this will be a big loss to the community.”
However, this property abuts shared space for public parking and access. While the property is protected by a covenant providing commercial fishermen with permanent access to the water, there have been significant conflicts during the summer months as non-commercial visitors to other parts of the property compete for parking and waterfront space. This illustrates that while a specific access point may be preserved, it does not necessarily avoid conflict or beget ease of use during peak tourist season. Access to the working waterfront has two points of entry: to the water via the wharf, and to the wharf via vehicle traffic and parking. One does not precipitate the other, but they are both necessary for commercial fishermen to conduct business.

Parking & Gear Storage

Whether public or private infrastructure, parking along the waterfront was repeatedly cited during surveys and interviews as a source of conflict and potential barrier to commercial fishermen gaining access to their boats in an efficient and timely manner. This includes spaces for vehicles, trailers, and boats, and can have real financial consequences when fishermen need to budget extra time in their day to address parking and/or the cost of parking increases due to market pressure. In The Last 20 Miles, adequate parking is listed as a key criteria used to define “prime working waterfront”. Most working waterfront areas have parking issues that are exacerbated in the summer months when tourists and recreation users increase in an area.

Parking in coastal communities in Maine is becoming an increasing issue for everyone, not just commercial fishermen, but it is imperative that designating parking for commercial fishermen is included in any town plan investigating ways to mitigate parking issues such as those described at Pine Point in Scarborough (above). It is also important to consider the seasonality of many of Maine’s coastal communities and identify how to accommodate fluctuating use that dramatically increases in the summer months.

Parking for commercial shellfish harvesters can be especially difficult with a limited number of access points to launch a small boat and park a trailer. It is important to not only protect waterfront properties and their related infrastructure, but the land adjacent to the waterfront that has the potential to be used as parking is an important asset as well. In numerous communities the ability to store, maintain, and repair gear was also cited as extremely limited and a factor contributing to the viability of working waterfront.

Many fishermen are moving further from the coast to be able to afford a home and inland communities may be less accustomed to seeing numerous traps, buoys, and nets being stored in front yards. And while moving further inland may save some money on mortgage payments and rents, traveling to and from the coast with gear increases the cost of doing business for fishermen in terms of both time and money. A major gear reduction or closure in the lobster industry would place major pressure on lobstermen not just to adapt to this change in their business, but to identify where to store their gear if they are unable to use it at sea.

“Not enough parking for recreational fishermen and commercial fishermen both. With absolutely no enforcement of parking. It gets needlessly worse each summer.”
Lessons learned

• In Stonington, an ad hoc committee was formed to deal with parking issues. The formation of the committee not only addressed a critical issue, but also helped achieve more buy-in from community members and ensured inclusion of those who would be most impacted by new rules, such as fishermen.

• In 2017, after an on-going dispute regarding the ownership of Cedar Beach in Harpswell, it was agreed that the public would still be allowed access, but the agreement stipulated that the town monitor the beach twice a day during the summer season. In order to fulfill its agreement, the town solicited volunteers. This model could be applied to public boat ramps to monitor use and ensure parking restrictions, time-limits, and other ordinances are being respected.
“Discrete Working Waterfronts”

Along the coast of Maine are numerous small working waterfronts, or discrete working waterfronts. These much smaller wharves or piers are often used by one or two fishermen, represent some of the oldest wharves in the community, typically do not offer berthing, may be home to small fish houses, and are usually used for gear maintenance and storage rather than access to the water. They are often quite old and would likely not meet requirements of the Army Corps of Engineers if they needed any permitting in order to be replaced or repaired. Occasionally, the true owner of the property is unclear, or they are held in an arrangement (legal or a gentleman’s agreement) with fisherman and property owner or fisherman and municipality. In some cases, when the fisherman who uses the wharf passes, the fate of the wharf is uncertain; it can either fall into the water in disrepair or revert back to the owner of the property who may not be connected or associated with commercial fishing.

These discrete working waterfronts are extremely vulnerable to storm surges and sea-level rise because of their location, age, and level of decay. Losing these discrete working waterfronts to events pertaining to climate change, transfer of property ownership to non-commercial interests, or because there is no plan for their future, would literally alter the landscape of fishing communities. It would also put more pressure on some of the larger wharves as more fishermen need access to them for gear storage and maintenance.

There are no specific funding sources available that can benefit these discrete working waterfronts and those that might be applicable, such as those found at the Maine Coastal Program, are part of much larger opportunities and would need to be applied for with partners and/or the municipality and are not focused on specifically benefiting commercial fishing businesses.

Discrete working waterfront properties are extremely vulnerable. In one survey, Lowell’s Cove on Orr’s Island was specifically cited as a space with multiple discrete working waterfronts and of great concern. The survey was completed in March of 2019. In December of that year one of the three small piers in Lowell’s Cove fell into the water in a storm. (Pictured at right.)
Climate Change & Sea-level Rise

Maine’s commercial fishing industry is on the frontlines of climate change impacts, facing more severe storms at sea; contending with rapidly changing and unpredictable weather patterns; and adapting to warming waters, migrating species, and fluctuating seasons. And in the intertidal, clam harvesters are facing influxes of invasive species and expanding closures because of increasing rain events, ocean acidification, and algal blooms.

The working waterfront infrastructure will be increasingly impacted by sea-level rise, king tides, and major storm surges, especially the most vulnerable discrete working waterfronts noted previously. These climate change impacts will influence the future use of both public and private working waterfront properties.

Not only are coastal communities grappling with the potential threats to working waterfront infrastructure, fishing families who live on the coast and own waterfront-dependent businesses face the increasing burden of flood zone insurance. Potential rate increases for flood insurance threaten to further raise the cost of living in coastal communities and create uncertainty in the real-estate market if the high cost of insurance deters future buyers.

Lessons learned

- Stonington has both sea-level rise and working waterfront reserves that allow them to act swiftly to purchase property for conservation and/or repair properties damaged due to sea-level rise. Harpswell is also looking at this model as part of their Climate Resilience Taskforce planning.

COMMUNITY CULTURE

For many in Maine’s coastal communities, fishermen, fishing, and the ocean are core to the culture of the area and that ethos is headquartered at the wharves that dot the shoreline. In one interview a fisherman recalled that when he was younger, “the wharf was where everyone hung out.” When he was a child, he could run down to the wharf and see what “the old guys” were doing and try to get on a boat to go fishing for things like lobster, menhaden, or groundfish. Even as he got older, he could find “the old guys” and other fishermen at the wharf to ask them questions about fishing, gear, and boat maintenance. He still goes to the wharf to visit with other fishermen, but the desire to linger, the connection to the past, and knowledge of some of the older fishermen was no longer there.

As the nature of the population within coastal communities change and tourism activity increases, it is important to acknowledge the fishing community as a valuable part of the culture and heritage. Local dialogue and changes in public policy can help provide support for commercial fishing activity, preserve important infrastructure, including discrete working waterfronts,

Solastalgia is a newly coined term that describes the stress one feels when their environment is changed, particularly due to climate change impacts or severe storms. This term could also be applied to a fisherman that is nostalgic for his community because it has undergone major development and/ or loss of working waterfront.
and celebrate the historical significance and knowledge that comes from “the old guys” and fishing families.

**Comprehensive Plans & Ordinances**

Many fishermen who responded to the survey were familiar with their town ordinances yet less than half thought those ordinances were working to protect the working waterfront in their community. As coastal municipalities begin to plan for sea-level rise, there is an opportunity for the towns to also reexamine the working waterfront in their current comprehensive plan and identify new or emerging priorities for the community and ensure that ordinances exist that reflect these priorities.

Of the communities interviewed, only Cutler did not have a comprehensive plan that mentioned the working waterfront specifically. While many do make mention of these topics, not all of them have ordinances that directly protect the waterfront, leaving some commercial fishing businesses vulnerable to conversion, development, or sea-level rise. Portland, Boothbay Harbor, Port Clyde/St. George, Surry and Jonesport have town ordinances specific to working waterfront uses. (See Table 1). Coastal communities, like all Maine communities, have limited staff and budgets making it difficult to uphold ordinances that can impact the waterfront.

It should be noted that across municipal comprehensive plans there are also varying definitions of working waterfront leaving some open to interpretation when trying to clearly understand ordinances and zoning. As populations in coastal communities change and summer residences increase, this could become more of an issue when ordinances and zoning are questioned and need to be interpreted to defend a business or position.

**Lessons learned**

- A right-to-fish ordinance was suggested in the Cundy’s Harbor report from 2004 and it is worth considering in more communities. The ordinance is modeled after the agriculture industry’s “right-to-farm” that has been adopted by a handful of Maine communities. This right-to-fish ordinance “permits some

**The Human Dimension of Working Waterfronts**

For most fishermen, being a fisherman is far more than an occupation; it is a way of life, a calling, a passion. Fishing is their identity.

The working waterfront is an extension of this and great change or loss to a working waterfront is impactful to more than just a fisherman’s business. Where once fishermen need only worry about maintaining the boat, checking the weather, and finding the fish, they now have numerous activities and uncertainties competing for mental space, and that includes conserving the working waterfront. The well-being and mental health of fishermen must be considered in the preservation of the working waterfront.

Many commercial fishermen suffer from some form of anxiety, depression, and PTSD. While little data exists about the mental health of fishermen, most fishermen interviewed for this report mentioned some form of avoidance, chronic fatigue, and “helplessness.”

The unpredictable future of commercial fishing and the fragility of the working waterfront are both heavily impacting the health of fishermen. There is an opportunity to heighten awareness about this growing epidemic and create opportunities for fishermen to learn more about depression and tools for coping.
‘nuisance’ like conditions due to fishing related activities…” This ordinance is not legally binding but does characterize commercial fishing as a priority for the community.

- The St. George comprehensive plan includes action specific steps to “ensure adequate future public access to shoreline areas while maintaining the environmental integrity of the coast and promoting the retention and development of open space in waterfront areas, and enhancing the working waterfront, wherever economically feasible”. Included under each priority are clearly stated actions (i.e. Ensure there is off-street parking and, where necessary/feasible pedestrian sidewalks to satisfy existing needs at the town landings.) and identifies who is responsible (in this instance the Harbor Committee). Being specific about the intentions and identifying who is responsible for each step ensures that the plan is realized.

- Portland has an extensive waterfront chapter in its comprehensive plan and continues to ban residential and hotel development on the water side of Commercial Street. The waterfront zones do allow limited non-marine development for office, restaurants and retail, subject to performance standards protecting marine use. In two waterfront zones, recreational berthing is limited to existing marinas with no opportunity for non-commercial berth expansion.

**Municipal Harbormasters**

Harbormasters are often the interface between the town and the activity along the working waterfront. Their duties are broad, ranging from harbor management and planning, mooring and dockage management, and public education to emergency search and rescue operations. Harbormasters are a fundamental part of the working waterfront and sometimes current or former fishermen themselves. As with Maine’s population in general, Maine’s coastal communities are experiencing an aging population of harbormasters and some communities lack a harbormaster all together.

Harbormasters have an intimate knowledge of the waterfront and, most importantly, the people who work and recreate along the shore. When an older harbormaster retires, it can have a profound impact on how the working waterfront functions. Occasionally, harbormasters and fishermen have gentleman’s agreements and an understanding over things like moorings and storage that are built on trust and understanding. These undocumented agreements between prior harbormasters and fishermen may not be upheld by new harbormasters and this can cause confusion and friction.

Harbormasters are vital to the stability and growth of working frontiers but are often overlooked in discussions about preserving Maine’s working waterfront. The burden on Maine’s working waterfronts and the harbormasters who manage them continues to increase. For example, the rise in aquaculture along the coast requires the active involvement of harbormasters and acquiring additional knowledge about aquaculture regulations. Harbormasters along the coast would benefit from resources towards building their capacity to participate in important discussions and maintaining both the health of the waterfront and the commercial fishing industry in their community.
**Current Use Valuation of Working Waterfront**

Intended to support commercial fishing activities, the current use taxation for working waterfront was enacted to “encourage the preservation of Maine’s working waterfront and to prevent the conversion of this land to more intensive uses as the result of economic pressures caused by high property taxes.” The town assessor calculates the value of the property based on its use as working waterfront rather than the value of the property at its highest and best use. This benefit is applied specifically to the value of the land and does not take into consideration the value of the [commercial fishing] business associated with the property.

Most recent data from 2017 shows that only 86 working waterfront properties have taken advantage of this program. Other types of properties with current use programs include open space and farmland with 2690 and 5589 parcels enrolled, respectively.

The low enrollment in the current use taxation program is likely due to a few reasons: 1) the property’s highest and best use is working waterfront activity and therefore there is no benefit, 2) the difference in tax value between the highest and best use and working waterfront designation is not significant enough, and 3) the fee for withdrawing the property from the program is too significant, thus discouraging enrollment. The penalty for removing a property prior to 10 years is 30% of the difference between the 100% working waterfront valuation and the fair market value. Failure to report a change in use results in the assessment of an additional 25% removal penalty.

**Working Waterfront Access Protection Program (WWAPP)**

The Working Waterfront Access Protection Program (WWAPP) is part of the Land for Maine’s Future program. WWAPP funds are used to purchase development rights through an agreement between the state and property owners so that it remains a working waterfront in perpetuity. Since established in 2011, 25 properties have been protected under WWAPP.

While WWAPP has been an instrumental program conserving working waterfront properties in communities such as Port Clyde, Boothbay Harbor, and Harpswell, the program is limited, and not all properties are appropriate for its use. In Portland, for example, the expenses associated with working waterfront property along Commercial Street’s Waterfront Central Zone are too high and many of the wharves host a variety of other businesses, like restaurants and law firms, that are not within the guidelines of the program.

For some, relinquishing development rights is too great a cost to be able to participate in the program. While some fishing families are already planning for and training the next generation of fishermen, others are uncertain about the potential of their families’ role in the future of the fishing industry. This great uncertainty, along with the unpredictability of commercial fishing in general, beget a need for extensive planning, thought, and consideration when deciding whether WWAPP is an appropriate option for working waterfront owners.

There are also a fair amount of working waterfront properties that are not appropriate for the program due to other circumstances such as: the money required to repair the wharf is comparatively small; the type of property, by definition, does not fall under the guidelines of the program, such as a public boat ramp used by commercial fishermen, boaters, and tourists; or, the type of project or upkeep to the property is not specific to commercial fishing activity, such as increasing parking for commercial fishermen.
WWAPP is a strong program and has benefited many communities, properties, and families, but it is not a universal program that can benefit the variety of working waterfronts along Maine’s rocky coast. Likewise, given its current funding level, the program is undercapitalized compared to the number and value of potential projects. Wharf-owners face a substantial decision to sell development rights and while a useful solution for some properties in need of repair or preservation, it is not appropriate for all fishing families and working waterfront owners.

Other possible opportunities for funding and resources for the working waterfront can be found in Appendix c.

**Lessons learned**

- The Port Clyde Fishermen’s Co-op has had success utilizing funds from WWAPP to renovate and improve their property while also making it available to fishermen who depend on fisheries other than lobster such as groundfish and scallops. Prior to WWAPP Port Clyde groundfish boats were leasing a privately held property.

**Conclusion**

Maine is seeing a lot of changes in its coastal communities as tourism increases and the desire to retire near the water becomes more popular. While coastal communities adjust to both a changing population and a changing climate, it is imperative for coastal towns and the state to proactively plan for a future that includes commercial fishing and the working waterfront. Many of Maine’s fishermen are dependent on lobster for the majority of, if not all of their income, and future changes to the lobster industry will have a significant impact on the economy and resiliency of the working waterfront. Failure to monitor changes to the working waterfront and to develop a plan that ensures the ability to not only conserve working waterfront but to aid in its ability to thrive will lead to the disappearance of Maine’s fishing communities. This report is an effort to heighten awareness and actions that will help preserve Maine’s working waterfront and not just protect a way of life, but ensure that fishermen are able to plan, adapt, and prosper into the future.
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Troy Plummer, Commercial Fisherman, Boothbay Harbor
Genevieve McDonald, Commercial Fisherman and Maine State Legislator
Amy Watson Saxton, Homes & Harbors Real Estate, Cundy’s Harbor
Jeff Romano, Maine Coast Heritage Trust
Stephenie MacLagen, Island Institute
Natalie Springuel, College of the Atlantic
Kathleen Leyden, Maine Coastal Program, Maine Department of Marine Resources
Bill Needelman, Portland Waterfront Coordinator

Special thanks to Nick Battista, Kristen Grant, Beth Bisson, and all the fishermen, community members, and town employees that were interviewed during this process.

Table 1: Select town data and information on working waterfronts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Portland</td>
<td>66,882</td>
<td>913</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Mixed-use</td>
<td>0</td>
</tr>
<tr>
<td>Harpswell</td>
<td>4,893</td>
<td>2,408</td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
<td>3</td>
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<tr>
<td>Boothbay Harbor</td>
<td>2,189</td>
<td>895</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>Maritime-water dependent</td>
<td>1</td>
</tr>
<tr>
<td>(This does not include Barter’s Island)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Clyde/St George</td>
<td>2,591</td>
<td>1,200</td>
<td>Y (developing strategy)</td>
<td>N</td>
<td></td>
<td>Commercial Fisheries/ Maritime Activities District</td>
<td>2</td>
</tr>
<tr>
<td>Surry</td>
<td>1,472</td>
<td>0</td>
<td>Commercial Fishing</td>
<td></td>
<td>N</td>
<td>Commercial Fisheries and Maritime Activities</td>
<td></td>
</tr>
<tr>
<td>Stonington</td>
<td>1,294</td>
<td>521</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>1</td>
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<tr>
<td>Milbridge</td>
<td>1,349</td>
<td>125</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Cutler</td>
<td>507</td>
<td>84</td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Jonesport</td>
<td>1,333</td>
<td>250</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>Mixed-use</td>
<td>1 (This does not include Beals)</td>
</tr>
</tbody>
</table>
Appendix a: Previous working waterfront reports

- Cutler Harbor Study (1986)
- Harpswell Fishing Industry Profile (1999)
- Preserving Coastal Fishing (2002)
- Cundy’s Harbor Working Waterfront Study (2004)
- The Last 20 Miles (2007)
- Linking Commercial Fishing to Land-Use Planning (2010)
- Can Coastal Management Programs Protect and Promote Water-Dependent Uses? (2010)
- Economic Analysis of Working Waterfronts in the United States (2013)
- Sustainable Working Waterfront Toolkit (2013)
- Casco Bay Report (2017)
- NOAA Fisheries Reports (Yearly Report)
- Accessingthemaineacoast.com

Appendix b: Guiding Questions for interviewing commercial harvesters

1. Tell me what the working waterfront means to you.
2. How long have you lived and fished here?
3. Tell me what has changed.
4. Are there any wharf properties you are currently worried about?
5. What is an example of a working waterfront that is thriving to you?
6. What type of support (infrastructure or otherwise) does your wharf business need right now? (Tell me some ideas that would help you succeed.)
7. How is you/ your business doing in general in the current climate?
   a. Climate change and sea-level rise.
   b. Fisheries management/policy.
   c. Well-being, family, community.
8. Would you mind telling me what else is worrying you right now? (As it pertains to your community and business.) What are you hearing on the radio from others?
9. What does the future of the working waterfront look like to you? (What do you think this area will look like in 5-10 years?)
10. What is something that you think can be done to improve or protect Maine’s working waterfronts?
Appendix c: Working waterfront tools

Maine State Programs:

- Maine Sea Grant (https://seagrant.umaine.edu/extension/coastal-access-and-working-waterfronts/)
- Small Harbor Improvement Program (SHIP) (https://www.maine.gov/mdot/pga/ship/)
- Community Development Block Grant Program (CDBG) (https://www.maine.gov/decd/community-development/cdbg-program)
- Accessing the Maine Coast (https://www.Accessingthemainecoast.com)

Community opportunities (Some of these are previous suggestions from the National Working Waterfront Network and previous Working Waterfront reports):

- Comprehensive Planning
- Waterfront Planning and Climate Resiliency Planning
- Waterfront Ordinances
- Zoning (mixed-use and commercial fishing)
- Protecting Waterfront Access and working with Land Trusts
- Supporting Water-Dependent Businesses
- Community Working Waterfront Fund
- Community Sea-level Rise Fund
- Tax Increment Financing (TIF)

Federal programs

- National Working Waterfront Network (formally referred to as the Sustainable Working Waterfront Toolkit) (https://nationalworkingwaterfronts.com)
Appendix d: Criteria for evaluating waterfront properties


The definition of working waterfront for commercial fishing incorporates more than just piers and wharves, but covers other critical infrastructure needed to maintain a viable business that relies on access to Maine’s coastal waters. Criteria to identify the potential working waterfront properties at greatest risk must also include the impact of future storm surge events and sea level rise. While state programs tend to focus on the overall benefits to the state from a working waterfront property, private funding should also target unique working waterfront properties that enhance local community value and connection to the commercial fishing industry. Discrete wharves may be of particular focus as they are often a key piece of infrastructure in a harbor but may only serve a few fishermen and therefore not rise to the attention of larger parcels.

Criteria for Evaluation:

1. Utility of the Property for Commercial Fisheries Business
   - Does the property provide all tide access?
   - Does the property or project offer protection for adequate parking and options for gear storage?
   - Is there on-site fuel, ice, bait and other necessities for commercial fishing businesses?

2. Economic and Community Significance of the Property
   - How many fishermen are using the property? Year-round or seasonally?
   - Are there similar properties available for the fishing community in this area or is this property unique?
   - What is the value of the landings and related cumulative economic impacts to the community?
   - Is there community support for protecting the property?
   - Are there alternative properties in the vicinity or is this property unique for this community?

3. Level of Threat of Conversion
   - How much have property values increased in the last 5 years?
   - Have there been any previous unsolicited offers on this particular property?
   - Is the current access via informal arrangement and thus threatened by potential changes in ownership?

4. Ability to Combat and Adapt to Climate Change
   - Is this property threatened by the impacts of climate change?
   - Does this property or project have means to address future threats of sea-level rise or storm surges?
This matrix provides an overview of the general categories of working waterfront properties with some examples of places and their potential infrastructure needs. Funding could be directed at each of these classes of working waterfront properties or targeted at a specific class.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>DESCRIPTION</th>
<th>EXAMPLES</th>
<th>POTENTIAL NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Dealer-owned</td>
<td>Greenhead Lobster, Stonington</td>
<td>Adapt to new fisheries/markets</td>
</tr>
<tr>
<td></td>
<td>Access to bait, fuel, berthing, moorings, parking. Protected by zoning. On-site lobster sales. All-tide access? Protected (WWAPP)</td>
<td></td>
<td>Sea-level rise mitigation</td>
</tr>
<tr>
<td>II</td>
<td>Co-op or family-owned</td>
<td>Cundy's Harbor, Port Clyde, Owl's Head, Milbridge</td>
<td>Adapt to new fisheries/markets, Sea-level rise mitigation, Updated infrastructure (cooler), Increased/better parking, Marketing</td>
</tr>
<tr>
<td>III</td>
<td>Discrete working waterfronts</td>
<td>Lowell's Cove, Orr's Island, Orr's Island Bridge</td>
<td>Structural, Historical/cultural preservation</td>
</tr>
<tr>
<td></td>
<td>Private access. No zoning. Ambiguous ownership Municipality-owned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Public boat ramps</td>
<td>Chebeague Island Stone Pier, Cape Elizabeth, Kettle Cove</td>
<td>Structural, Parking</td>
</tr>
<tr>
<td></td>
<td>Public access. Support commercial and recreational. Municipality-owned</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Guidance on Fishermen Interview Techniques

One notable aspect of this report is that the investigator and author lives on Orr's Island, Maine, part of Harpswell, and is married to a commercial fisherman. This somewhat unique situation created bias, but also created an opportunity in which to ask more people about the working waterfront in relaxed settings. These informal conversations led to unstructured interviews but more thoughtful and deeper conversations. The ability to appropriately conduct interviews with fishermen should be thoroughly considered in order to strengthen future reports and better understand the input and concerns of harvesters. If fishermen are unable to have a seat at the table, it is crucial that their input be sought via other proper processes and in a way where they can openly and easily provide input. In order to facilitate future dialogue, the following guidance is suggested:

Guiding framework for interviewing commercial harvesters.

- Try to learn about the fishery and community of the fisherman that you are interviewing.
- Don’t try to be an insider. Even if you are indirectly connected to a fishing family, fishermen will still think of you as an outsider and assume that you “just don’t get it.” So, ask a lot of questions and practice good listening.
- Be upfront and direct with fishermen. Tell them what you need to know and why, and how you are going to use that information. Be clear about what you are asking them and explain how your efforts are intended to support their industry.
- Validate the fisherman’s insight, suggestions, and opinions. It doesn’t mean you have to agree but this builds trust and lets the fisherman know you are listening.
- Fishermen tend to be visual and share information via storytelling. Rather than asking a fisherman, “Where do you see yourself in five years,” ask them, “Imagine yourself fishing with your grandkids in five years, what are you seeing and talking about?”
- Fishermen tend to process information and think deeply about questions that are important to them, so be sure to follow up after the interview and ask if there’s anything they thought about more after you have chatted. (Regardless, you should always follow up with a thank you.)
- Fishermen are often guarded when being asked questions and will cross their arms. Be aware of their body language and listen to it just as you listen to their words.
- Understand that as the interviewer you are gaining more than the fishermen. Acknowledge that but take the time to also ask the fishermen about what they need regarding the interview topic.
- Do not rush off just because you have what you need. Fishermen work in an isolating occupation and overall, they like to talk about their work and learn more about what other people are doing in the industry.
- Fishermen are also known to share the most information as they are standing up to leave or walk out the door. Plan on being able to go with the flow, spend more time than you anticipate, and not always be able to write things down. (This is called the doorknob phenomenon in some fields.)
- Try not to use your laptop to take notes. Putting a physical object between you and the fisherman, especially something like a laptop, is a physical boundary, a reminder that the interview is being documented, and breaks eye contact.
- When your project is complete, share it with the fishermen whom you interviewed.
Maine Aquaculture Workforce Development Strategy Summary
Aquaculture holds great promise for maintaining – and expanding – Maine’s marine economy and working waterfronts. Through aquaculture, Maine’s coastal communities can continue their maritime heritage by augmenting wild fisheries with growing sustainable, premium-quality seafood. Maine is uniquely positioned for sustained aquaculture growth owing to an abundance of cold clean waters, proximity to large markets and distribution centers, the ‘Maine’ brand, strong industry representation, world class research centers, first-rate education and training institutions, and support from nonprofits focused on community economic development. However, the lack of a trained workforce could jeopardize Maine’s aquaculture future.

As part of its strategy to spur job growth in aquaculture, FocusMaine sponsored the Gulf of Maine Research Institute (GMRI) and Maine Aquaculture Association (MAA), in partnership with Educate Maine, to create a strategic roadmap for Maine aquaculture workforce development. The partners then contracted a team drawn from four Scottish consulting firms1 to lead development of that roadmap to tap expertise from a country with a developed industry and to ensure complete objectivity. The consultants brought international aquaculture expertise in business development, workforce development analytics, and workforce training at both higher education and vocational levels. The Maine-based partners helped orient the Scottish team to the aquaculture and education landscape in the state and supported the research by organizing meetings with businesses and institutions, organizing and convening steering committee meetings, and co-developing and administering surveys and interviews. This summary reflects the consultants’ recommendations from the comprehensive report: The Maine Aquaculture Workforce Development Strategy (see link below).

Direct input from Maine’s aquaculture industry – including established and prospective land-based operations, marine producers, service providers, and supply chain companies - formed the base of the analysis. Over the course of the work, the consultants met with 15 businesses and 62 businesses were formally interviewed or surveyed. In addition, they met with representatives of 17 of Maine’s education or training institutions and surveyed another 33. GMRI convened a steering committee of 30 representatives from various Maine education and training institutions to provide feedback throughout the project. The resulting strategy described in this summary leverages existing resources in Maine and anticipates how workforce needs will change as the industry develops over time.

Note: The analysis and strategy focused primarily on education or training programs with a direct connection to long-term employment at an aquaculture sector business. Although non-vocational programs fell outside the project’s scope, they complement workforce development efforts by increasing aquaculture career awareness and supporting development of some of the core skills valued by employers from a range of sectors, including aquaculture.

1 Martyn Haines, Pisces Learning; Andrew Parker, Imani Development; Pamela Reid, Ekosgen; and John Bostock, University of Stirling

The aquaculture sector has grown in Maine over the past 10 years and comprises large scale finfish production alongside a constellation of generally smaller firms operating in shellfish (oysters, mussels, scallops) and marine algae.

In addition, there are new entrants that reflect the growth of the sector and in some cases new production models:

- In finfish, land-based Recirculating Aquaculture Systems (RAS) are moving from a globally nascent production model into a new finfish production system for Maine. Inward investment is coming from national and international firms.
- In shellfish, newcomers and existing producers are improving productivity to continue a scaling up of the sub-sector within the existing model.
- The sea vegetable (marine algae) sub-sector is growing through a combination of production models and expanding volume through contract-growers, particularly lobster businesses growing kelp in the winter.

**Current Employment and Growth Trends**

Maine’s total aquaculture workforce exceeds 600 direct employees, plus auxiliary services, further trades, transport, processing, equipment supply, and retail employment across the value chain.

Based on interviews with existing and prospective business owners, it is expected that:

- by 2022 the aquaculture workforce will comprise around 880 employees across production and related direct activities, and over 1,600 across the supply chain; and
- by 2030 the workforce could exceed 1,000 direct employees, and over 2,000 in the total production, supply chain and downstream markets.

<table>
<thead>
<tr>
<th>Table 1: Employment Growth Through 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2022</strong></td>
</tr>
<tr>
<td>Low</td>
</tr>
<tr>
<td>697</td>
</tr>
</tbody>
</table>

**Note:** High, medium, and low scenarios are estimated based on anticipated growth trends under different economic, technological, market, regulatory, and social drivers. See Growth Scenarios and Drivers section of full report for complete details.

---

**Figure 1:** Development of Maine’s Aquaculture Sector
Skills Needed for a Vibrant Industry

**Core Skills**

Maine’s current aquaculture sector places the highest value on the core skills of:

- Work ethic
- Life skills/problem solving
- Basic trades (plumbing, electrical, mechanical, light manufacturing/fabrication)
- Basic aquaculture husbandry
- Maritime operation

Most businesses felt that, for most positions, workers equipped with these core skills can learn any additional technical and scientific skills in-house; but not vice-versa. Industry views the workforce training priority as establishing a foundation of these core skills that they can then build upon through on-the-job training. Figure 2 here shows the feedback from industry stakeholders, acquired through numerous interviews, regarding the range of necessary skills. Core skills are shown as the dark blue base tier.

**Figure 2: Maine Aquaculture Sector Skills Pyramid as Perceived by Industry**

**Practical Experience**

Businesses place a high value on practical know-how. Maine’s industry stakeholders believe that on-the-job training is valuable but would be better supported through programs structured to develop and formalize occupational competencies.

**Positions Within the Industry**

Various job types across the sector generally fall into seven position categories described in Table 2 (next page).
<table>
<thead>
<tr>
<th>POSITION</th>
<th>JOB DUTIES</th>
<th>HARD SKILLS</th>
<th>SOFT SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Directors (13%) &amp; Senior Management (18%)</strong></td>
<td>Oversight and continuity of the business; understand all aspects of the business; financial well-being; strategic direction. Smaller companies require all-around engagement by director. Larger firms will have directors focused on departmental functions.</td>
<td>Financial planning and management; business administration; business development; operations planning and management; husbandry; regulatory compliance; HAACP basics; maritime; health and safety; sales; marketing; personnel management; logistics; general science.</td>
<td>Strategic thinking; communication; conflict resolution; problem solving; leadership; prioritization; delegation; work ethic.</td>
</tr>
<tr>
<td><strong>Scientific / Research (7%)</strong></td>
<td>Lab work; routine testing; molecular / genetic requirements. Examples: Molecular biologist; aquatic veterinarian. May differ between service providers and production.</td>
<td>Lab and research skills; regulatory compliance; disease management; fish health; molecular biology; genetics; testing / running assays; digital literacy; record keeping; grant writing</td>
<td>Analytical; critical thinking; ability to follow internal protocols; communication; writing; work ethic.</td>
</tr>
<tr>
<td><strong>Skilled and Intermediate Technician / Operative (7%)</strong></td>
<td>Day-to-day tasks in hatcheries, marine growout, land-based processing facilities, and laboratories. Examples: Farm Crew; Processing Crew; Fish Health Coordinator; Vaccine Specialist.</td>
<td>Equipment operation and maintenance; SCUBA; maritime; mechanical tool use; regulatory protocols; production techniques; seed stock handling; lab and research; digital literacy; record keeping.</td>
<td>Communication; Problem solving/critical thinking, conflict resolution; work ethic.</td>
</tr>
<tr>
<td><em><em>Unskilled</em> Technician / Operative (42%)</em>*</td>
<td>As above, implementing day-to-day tasks. Farm and processing crew: fulfilling more basic functions of farm and processing crew. Non-technical lab technician: Cleaning, filling tubes, labelling, organization.</td>
<td>Helping under supervision with activities listed for &quot;Skilled (and Intermediate) technician / operative&quot; above. *Despite ‘unskilled’ categorization, are expected to quickly obtain technical skills.</td>
<td>Communication; time keeping; teamwork; problem solving; work ethic.</td>
</tr>
<tr>
<td><strong>Maintenance / Engineering (6%)</strong></td>
<td>Maintaining and repairing a range of machinery and production functions (hydraulics, pneumatics, engines, electrical systems, plumbing, construction/fabrication)</td>
<td>Maritime skills; vehicle, machinery and boat maintenance (pneumatic tools); health and safety; natural science; production processes; time / temperature controls, thermometer calibration; digital literacy; record keeping.</td>
<td>Communication; problem solving and conflict resolution; organization; work ethic.</td>
</tr>
<tr>
<td><strong>Support / Administration (6%)</strong></td>
<td>Various: Sales; record keeping; accounting; human resources; information technology; financial management tasks; audit compliance. More specialization of roles in larger companies. Smaller companies noted HR and IT as area not easily covered by managers.</td>
<td>Various: office management; IT; accounting; HAACP basic; disease management; call handling; regulatory awareness, digital literacy; record keeping.</td>
<td>Problem solving; communication; teamwork; work ethic.</td>
</tr>
</tbody>
</table>

Table 2: Overview of Common Skills Needs by Position Category. Percentages indicate representation within Maine’s 2019 Aquaculture Sector. See full report for additional detail.
## Workforce Education, Training Supply and Demand

<table>
<thead>
<tr>
<th>INDUSTRY DEMAND</th>
<th>SUPPLY</th>
<th>PROPOSED ROLE WITHIN CORE OF VOCATIONAL EDUCATION AND TRAINING PIPELINE</th>
<th>FUTURE ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIGHER EDUCATION</strong></td>
<td>Low. Majority of jobs require foundation of non-higher education type skills, technical / science procedures do not require HE degree and are taught in-house.</td>
<td>Ample. Supply being met by marine biology, general-science, engineering, and miscellaneous degree programs in ME and the US.</td>
<td>Make aquaculture R&amp;D facilities and staff available to CC &amp; CTE vocational signature industry programs.</td>
</tr>
<tr>
<td><strong>COMMUNITY COLLEGE</strong></td>
<td>High. Aquaculture sector values foundation of practical and trades skills typical of CC associates degree programs.</td>
<td>Low. Commercial Fishing &amp; Marine Tech certificate program at Washington County Community College.</td>
<td>Establish vocational hub at Southern Maine Community College &amp; Washington County Community College that tie to CTE signature industry program at Mid-Coast School of Technology and Aquaculture Apprenticeship program.</td>
</tr>
<tr>
<td><strong>ADULT EDUCATION</strong></td>
<td>High. lots of interest in aquaculture technical training programs for new farmers and fishermen.</td>
<td>Ample. There are two well-regarded and fully-enrolled programs being offered through Aquaculture In Shared Waters and the Aquaculture Business Development Program.</td>
<td>Status quo. Potential for linkages to mid-coast vocational signature industry program.</td>
</tr>
<tr>
<td><strong>CAREER TECHNICAL EDUCATION (9-12)</strong></td>
<td>High. Aquaculture sector values foundation of practical and trades skills typical of vocational CTE programs.</td>
<td>Very limited. High school programs are not filling vocational skills void.</td>
<td>Establish CTE signature program at Mid-Coast School of Technology in Rockland that links with community college and Apprenticeship programs.</td>
</tr>
<tr>
<td><strong>HIGH SCHOOL STEM</strong></td>
<td>Low. For direct employment, critically important to career awareness and achieving social license.</td>
<td>Low. A handful of aquaculture STEM-based programs exist at Maine’s coastal high schools.</td>
<td>Develop aquaculture programs for high school teachers to enrich science curriculum and promote aquaculture careers.</td>
</tr>
<tr>
<td><strong>APPRENTICESHIP</strong></td>
<td>High. Strong demand for workers with occupational-comptency based experience.</td>
<td>Low. Limited internship offerings and no formal programs.</td>
<td>Establish formal Aquaculture Apprenticeship Program through the Maine Department of Labor</td>
</tr>
</tbody>
</table>

Table 3: Skills supply & demand and proposed roles within the aquaculture workforce development strategy.
The consultants recommend developing a vocational education and training (VET) system with: 1) three regional vocational hubs, 2) an apprenticeship program, 3) an occupational coordinator tasked with development of Occupational Standards, and 4) a marketing effort to inform learners and businesses about the VET. The approach leverages existing vocational-oriented partnership models between Community College, Career and Technical Education (CTE), and Maine Department of Labor Apprenticeship (Apprenticeship) to foster long-term program sustainability; and account for regional macro-factors that make employee recruitment and program delivery difficult. The VET model caters broadly to the industry's diverse and evolving needs by providing a foundation of transferable core skills that can be built on through higher-education programs.

### Workforce Development Strategy

#### 1. Three Vocational Hubs

At the core of the system are coastal community colleges and a CTE school to provide much-needed vocational training. Because they are financially accessible to most people and designed to cultivate local talent, Maine's community colleges are uniquely positioned to provide vocational aquaculture training. The strategy envisions a two-year aquaculture Associates Degree that includes the core skills cited by industry and can be built in large part from existing program offerings.

##### a. Southern Vocational Aquaculture Hub: Southern Maine Community College

Southern Maine Community College (SMCC) in South Portland is well positioned to fill the vocational education and training gap to meet demand in the southern part of Maine. In addition to offering courses in trades and business management/administration, SMCC has a respected marine science program and staff with aquaculture husbandry and business experience. SMCC is adjacent to Casco Bay, where commercial aquaculture and the potential for industry linkages are widespread.

##### b. Mid-Coast Vocational Aquaculture Hub: Mid-Coast School of Technology

The Mid-Coast School of Technology (MCST), a CTE center in Rockland, is well positioned as lead organization for vocational training in mid-coast Maine, with the University of Maine as a key partner. As a CTE school, the MCST is equipped to provide basic training in core practical skills and basic science at the high school level and can extend relationships with community college and Apprenticeship partners for specialized training as necessary. While interested and motivated to serve vocational aquaculture demand in mid-coast Maine, where aquaculture is established and growing, the MCST would need support for aquaculture-specific course delivery. The University of Maine, through the Darling Marine Center and Aquaculture Research Institute, has the high-quality staff and facilities necessary to train students (or provide exposure) in husbandry, specialized marine biology, wet lab, and RAS systems.

Marketing support for this signature vocational aquaculture program is critical, because CTE Centers draw from regional high school students who opt for the technical, career-oriented track at a CTE center instead of their local high school. Potential students must understand the distinction between any aquaculture STEM programming offered at their local high school and the CTE's in-depth vocational aquaculture track.

(Continued on next page)
2. Aquaculture Apprenticeship

A Maine Department of Labor-approved aquaculture apprenticeship program has a vital role to play within the aquaculture workforce pipeline by providing practical experience and competence testing in a commercial setting. The program would also provide credits toward a community college associate degree.

c. Downeast Vocational Aquaculture Hub: Washington County Community College

Washington County Community College (WCCC) in Calais is well positioned as lead organization to fill vocational aquaculture training demand in Eastern Maine. This region’s aquaculture industry is primarily salmon farms, a hatchery, and value-added processing facility, all operated by Cooke Aquaculture. A partnership with the Downeast Institute on Beals Island, would give students access to aquaculture-specific husbandry and science. This program should be designed broadly, to include proximate sectors with similar skills needs such as commercial fishing.

3. Occupational Standards Development and Coordinator

Effective aquaculture workforce supply relies on close collaboration with the industry and should adhere to specific standards that are developed in partnership with industry and routinely updated. This will be particularly important as Maine’s current industry professionalizes and pioneering land-based aquaculture companies become operational. The process should be led by a full-time Occupational Standards Coordinator, housed within the community college system, working closely with the Maine Aquaculture Association and industry to capture the skills requirements of aquaculture staff at all levels within each subsector. For the system to remain responsive, regular skills evaluation and forecasting must become a part of the aquaculture workforce development review system to constantly flag the need for new credentials, to ensure training is technically current.

4. Marketing of Signature Programs

Initial marketing support is required to complement and support the signature vocational aquaculture programs until industry recognizes the credentials as providing the core skills they want their employees to have. Over time, industry will increasingly respect formal vocational aquaculture education and training and preferentially seek qualified new entrants. As this becomes apparent, the demand from learners will grow, increasing the viability of these signature programs.
Key Additional Elements

Partnerships
A strategically driven collective effort between education and training providers and industry is necessary to maximize and braid funding opportunities together to develop the new essential core VET programs initially and then to achieve long-term financial sustainability. Continuation of the Aquaculture Workforce Development Steering Committee, formed and led by GMRI and Educate Maine during this process, is a natural forum where these discussions can continue.

Lessons from Abroad: Oversupply / Misalignment Failure
It is critical to align programing with student and industry demand. Programs need sufficient enrollment to be financially viable; supply and expectations of graduates should match available jobs; and industry must recognize and respect formal qualifications. In the short term, funding should be allocated to address the vocational education and training gap identified by our research as the highest priority. The quality of the new provision, the reputation of providers and the credibility of the credentials and qualifications delivered, are all dynamic parameters that will shape the ebb and flow of demand over time and require constant management.

Potential for Maine as an International Aquaculture Training Hub
There is potential for Maine’s higher education sector to attract international students. The United States has a strong reputation for higher education and as an English-speaking country will be attractive to a wide variety of students. While college fees are generally high in the US by international standards, costs for universities in Maine are not too different from alternatives in UK or Australia. Given the projections for global aquaculture growth, there should be a clear case for US institutions to develop similar capacity, and Maine may be sufficiently diverse in its production, with active aquaculture educators, to be a good candidate. To deliver this would require a significant investment in faculty/staff.

Conclusion
The full Maine Aquaculture Workforce Strategy report provides detailed, practical recommendations for developing, instituting, and sustaining a comprehensive workforce development system for the state. Maine’s aquaculture industry is poised to grow across all existing and nascent sub-sectors. It is the perfect time to embark on the strategy to provide the industry with skilled, dedicated labor and create pathways for Maine talent to enter this important growth sector.

As partners in FocusMaine’s initiative to grow jobs in Maine’s aquaculture sector, GMRI, MAA, and Educate Maine are grateful for FocusMaine’s support and essential funding, to the members of the steering committee who devoted significant time to ensure a rigorous product, the team of consultants who brought insights and objective analysis to the topic, and the many businesses who offered their time and experience to inform the work.

The strong, open partnerships that helped create this strategy will remain crucial to its long-term success. The more the educational institutions remain connected to the aquaculture industry and each other, the more effective and generative their offerings will be. As the industry grows and evolves, new opportunities and needs will arise, which will reward innovation and elevate Maine’s aquaculture industry even further.