

**ASSESSING THE POTENTIAL ECONOMIC COSTS
OF AMERICAN AQUAFARMS PROPOSAL IN
FRENCHMAN BAY:
AN ECONOMIC AND COMMUNITY
VULNERABILITY ANALYSIS**

PREPARED FOR FRENCHMAN BAY UNITED

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II. Executive Summary

In October 2020, American Aquafarms, a company backed by Norwegian investors, announced their plans to build one of the world’s largest net-pen salmon farms, potentially bringing new jobs and economic benefits to the local community and the state. The project was proposed to be located off the Maine Coast in Frenchman Bay, less than 2,000 ft from Acadia National Park.¹ This aquaculture project would raise 66 million pounds of salmon annually in thirty 150’ diameter pens at two different 60-acre lease sites. The pens would use a “semi-closed” technology that has never been used on this scale before.

During their engagement with the community, American Aquafarms, likely overexaggerated several of the benefits of the proposed salmon-farm, and ignored many of the potential costs to local communities. This raised concerns not only about this project, but also about future efforts to site large-scale aquaculture facilities in Downeast communities.

This analysis addresses those concerns by taking a deeper look at the risks to the local economy from a large-scale aquaculture project, examining the potential impacts on the fabric of local communities, and taking a closer look at some of the assumptions made by American Aquafarms. While this analysis focuses on the communities surrounding Frenchman Bay, there are lessons that can be transferred to other communities along Maine’s Downeast coast.

Frenchman Bay is situated near the popular tourist destination of Bar Harbor which serves as a gateway to Acadia National Park, making it a favorite spot for many visitors from around the world. The bay is home to a unique and diverse ecosystem that is influenced by its geography, tides, currents, and the interaction between freshwater and saltwater habitats. Its unique ecosystem has driven the rich fishing heritage that is integral to the local culture and economy of the state for centuries. *Distilled to its simplest form, Frenchman Bay currently supports a vibrant local economy. The large-scale aquaculture project proposed by American Aquafarms would put that economy at risk.*

Maine’s ocean economy—those industries that rely upon the ocean—encompasses a wide range of activities, such as fisheries, ship and boat building, and marine transportation. However, two industry sectors stand out in terms of jobs and dollars; Tourism/Recreation and Commercial Fisheries.

¹ Kochman et al., “Preventing Monster Fish Farms in Maine,” 6.

Tourism and recreation play a critical role in Maine's ocean economy, constituting 63 percent of the total employment, and show consistent growth over the past decade (See Figure 1). Specifically, the two "tourism" industries—"Eating and Drinking Places" and "Hotels and Lodging Places"—account for 94 percent of employment in this sector. The wide array of "recreation" industries in this sector, which include marinas, RV parks, campgrounds, chartered boat trips, fishing excursions, and other recreational services, make up the remaining 6 percent.

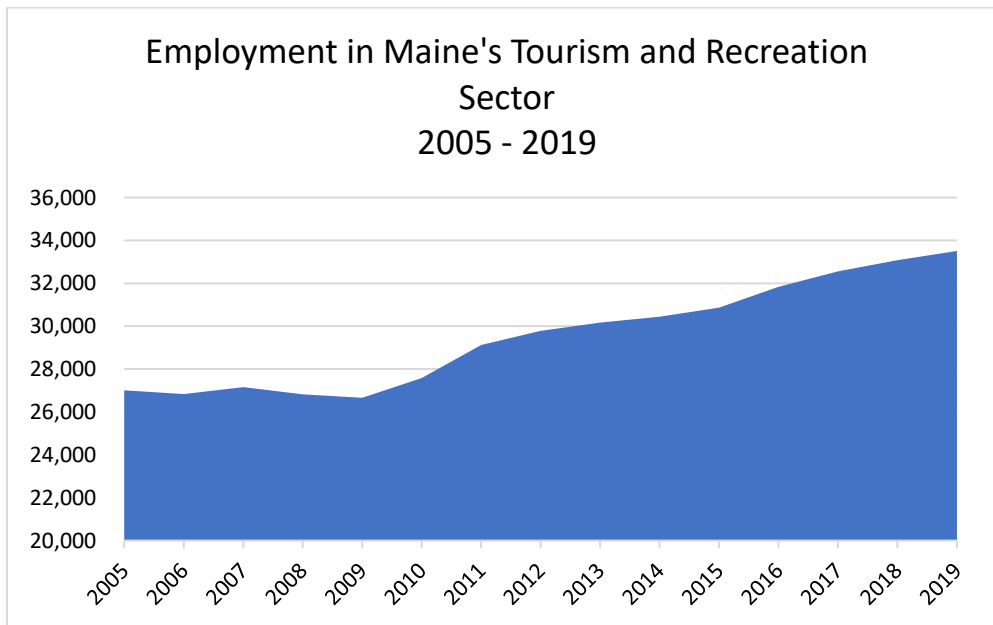


Figure 1. Employment in Maine's Tourism and Recreation Sector 2005-2019

In Hancock County, nearly 4 million visitors to Acadia National Park added \$479 million to the local economy in the form of visitor spending, supporting nearly 7,000 jobs and contributing \$691 million to the national economy in 2022.² People from other parts of the country and from around the world visit Acadia National Park, bringing significant revenues to hotels, restaurants, campgrounds, kayak rentals and other recreational vendors, retail shops, grocery stores, and other local businesses.

A healthy environment supports a healthy economy. Tourism and recreation rely on a healthy and pristine environment and are vital to the economy. Changes to the environment that attracts tourists can have far-reaching consequences on tourism and recreation businesses and the employees that work for them. Both hotels and restaurants, as well as the recreational activities that attract the visitors who patronize these establishments, are likely to be harmed by changes to the local environment. The visual impacts of thirty pens capable of producing 66

² <https://www.nps.gov/acad/learn/news/20230830.htm>

million pounds of salmon each year would spoil the natural vistas that attract visitors to the Maine coast, and the impacts from operations of the salmon farm would ripple throughout the community.

The state of Maine is perhaps best known for its lobster fisheries, and Hancock County supports more fishing jobs than any other Maine county. The importance of Maine’s fishing industry is more obvious when viewed in terms of its economic impact. In 2021, this industry had a total economic impact of \$1.6 billion across the state. Over the past decade, seafood harvests experienced substantial growth, rising by nearly 50 percent between 2009 and 2016. Although there was a slight decline in the subsequent years, the industry remained robust, and bounced back after COVID to produce record landings of \$954 million in 2021.³ *American lobster dominates Maine’s fishery landings, comprising 78 percent of the total revenues—\$742 million. The salmon farm proposed by American Aquafarms would be sited right in the middle of some of the most profitable fishing grounds in the country.*

In addition, Maine’s fishing heritage is at risk. The fishing industry is extremely sensitive to change and relies on a balance between environmental conservation, economic viability, and social welfare. Analysis of social vulnerability indicators shows that communities in Hancock County, rely heavily on the fishing industry to support their livelihoods, their families, and their culture (See Figure 2). Overfishing, pollution, and environmental degradation all have the potential to deplete fishing populations and disrupt marine food chains that threatens the stability of fisheries and the communities that rely on them. For generations, fishermen have been working collaboratively, and successfully to sustain the fishery that shapes the communities surrounding Frenchman Bay.

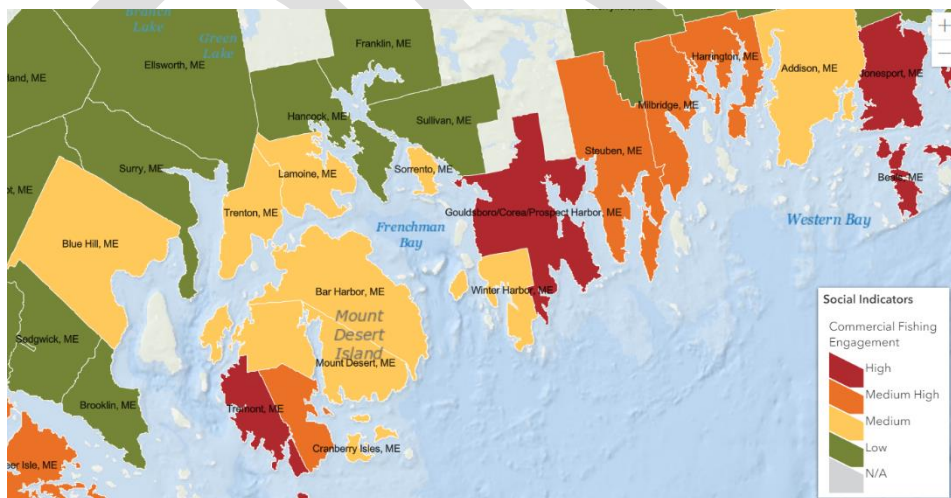


Figure 2. Commercial fishing engagement map, 2020

³ National Marine Fisheries Service, “Fisheries Economics of the United States.”

Community focus groups held during the spring of 2023 with local residents exposed concerns with the potential for industrial-scale finfish aquaculture being implemented in Frenchman Bay. Those concerns centered around four main topics:

- 1) the size of the operation,
- 2) potential impacts on existing aquaculture and fishing operations, including deficiencies in the Maine's permitting system,
- 3) potential impacts from the infrastructure development needed to develop and operate the proposed aquafarm, and
- 4) the potential impacts on adjacent communities, and the future of Maine's cultural fishing heritage.

American Aquafarms proposed to build the largest aquaculture operation in Maine, which would have brought bring new jobs and economic benefits to both the local community and the state. However, the benefits that are generated should outweigh the costs that are incurred, and the benefits and costs must be distributed fairly. American Aquafarms failed to demonstrate that either of these conditions would be met, and there are valid reasons to believe it would fall short on both accounts.

The benefits created by the development would be offset, partially or completely, by costs to the community and local businesses. Any large-scale aquaculture operation in Frenchman Bay would lead to pollution of water, air, and light, at some scale, along with noise, and negative visual impacts. This would directly impact the profitability of local businesses, including coastal tourism and recreation, commercial fishing, and small-scale aquaculture enterprises.

With Maine's current unemployment rate below 3 percent, promises of bringing in jobs to the community are unrealistic. Local businesses already face challenges in recruiting and retaining workers. Recruitment of workers is likely to come from outside of Maine, raising questions about the desirability of an economic enterprise where the benefits go to newcomers while the costs are borne by local residents and businesses.

American Aquafarms' failure to account for or honestly assess the potential negative impacts on existing businesses in Maine makes it impossible to determine whether their project would generate overall benefits exceeding the costs. Even though the American Aquafarms permit was denied by the state, this likely won't be the last attempt to industrialize Maine's coastal communities. Those who want to preserve Maine's coastal fishing heritage, and conserve the natural resources that form the basis for a vibrant coastal economy, should continue to proactively work with State and local legislators to determine if—and where—large-scale aquaculture projects are appropriate.

III. Introduction



Figure 3. View of Frenchman Bay from Cadillac Mountain.

Frenchman Bay is an historically significant body of water situated along the eastern coast of Maine, in Hancock County (See Figure 3). The bay lies between the Schoodic Peninsula to the east and Mount Desert Island to the southwest. It contains 39 islands, many with a long history of farming, fishing, and harvesting timber. The bay is situated near the popular tourist destination of Bar Harbor which serves as a gateway to Acadia National Park, making it a favorite spot for many visitors from around the world. The bay is home to a unique and diverse ecosystem that is influenced by its geography, tides, currents, and the interaction between freshwater and saltwater habitats. Its unique ecosystem drives the rich fishing heritage that is integral to the local culture and economy of the state for centuries.

Frenchman Bay is surrounded by several working fishing communities including Bar Harbor, Winter Harbor, and Sorrento. These communities have a rich fishing heritage that has been integral to the local culture and economy of the region for centuries. Maritime cultural heritage shapes coastal regions by contributing to their identity and the sustainability of coastal

communities.⁴ Fishing provides a lifestyle that creates strong, ingrained connections to specific places and influences the personal and collective identities of both local inhabitants and tourists in coastal communities.⁵

While it is difficult to put a dollar value on the worth of cultural heritage, national studies have shown that there is a growing demand for heritage-based tourism among travelers in the United States.⁶ Both Traditional Ecological Knowledge and Local Ecological Knowledge play significant roles in sustaining Maine's coasts. This knowledge is passed down from generation to generation and is based on a long-time series of information and empirical observations about ecological relationships. Interest in traditional ecological knowledge⁷ and local ecological knowledge⁸ has been growing in recent years due to a recognition of its benefits to conservation biology. For generations, Maine fishermen have been collaborating to work in a sustainable manner that will preserve the fishery for generations to come. This community-based conservation also helps sustain the pristine coastlines and unique ecosystems that bring tourists from all around the world.

Frenchman Bay is not only a place of natural beauty but also an important ecological habitat. The bay is home to a diverse array of marine life, including seabirds, seals, porpoises, whales, and Maine's most famous export—lobster. The bay provides opportunities for viewing wildlife, recreational and commercial fishing, including lobstering, and small-scale aquaculture, which are integral to the local economy and cultural heritage of the region. One of the many popular activities in Frenchman Bay is whale watching. The bay's proximity to the Gulf of Maine, which is rich in marine biodiversity, makes it an excellent location for observing multiple species of whales and other marine life. Another popular activity in Frenchman Bay is sailing and kayaking, and the bay's sheltered waters make it a perfect location to do so. There are many kayaking rental services and guided tours available in the area. The guided tours often provide knowledgeable guides who can share insights about the local ecology, wildlife, and history. Sailing and kayaking also provide a unique opportunity to observe wildlife up close.

Acadia National Park

One of Maine's most visited tourist spots, Acadia National Park (See Figure 4) lies on both the east and west coasts of Frenchman Bay, and is considered to be the crown jewel of the North

⁴ Martino et al., "Importance of Local Fisheries," 1.

⁵ Khakzad et al., "Role of Fishing Material Culture in Communities," 95-97.

⁶ Claesson et al., "Fishing Heritage Festivals," 421.

⁷ Bereks et al., "Rediscovery of Traditional Ecological Knowledge," 1251.

⁸ Aswani et al., "Global trends of local ecological knowledge," 1-2.

Atlantic coast.⁹ The park hosts around 4 million visitors per year where people travel from around the world to experience the breathtaking landscapes, panoramic views, outdoor recreational activities, and the rich variety of wildlife and ecosystems.¹⁰ Acadia National Park holds a distinguished position among the top 10 most visited national parks, driving an extensive outdoor recreational economy centered around Frenchman Bay. Frenchman Bay supports over 60 outdoor recreation businesses, 55 hotels and motels, and more than 1,000 bed and breakfast establishments. As visitors explore Acadia's natural wonders and engage in various outdoor activities, they also contribute to the thriving economy in and around Frenchman Bay.

Within Acadia National Park lies one of Frenchman Bay's most iconic landmarks, Cadillac Mountain. Cadillac Mountain is the highest peak along the eastern coast of the United States and offers breathtaking panoramic views of the bay, especially during sunrise and sunset. This area is the homeland of the Wabanaki people, who have been enjoying the spectacular views of the glaciated coast and island landscape for thousands of years.¹¹ Aside from the magnificent views during the daytime, Acadia National Park is also renowned for its stunning night sky. In this remote part of Maine, the absence of significant light pollution makes it an ideal location to observe the night sky.

⁹ National Park Service. "Crown Jewel"

¹⁰ Ibid

¹¹ Ibid



Figure 4. Acadia National Park entrance sign.

The National Park Service actively manages and protects Acadia’s ecology to preserve its ecosystems, cultural heritage, and visitor experiences that face many environmental threats.¹² Historically, park managers attempted to preserve parks based on historic conditions. This however has changed in recent years with the recognition of rapid change occurring in ecosystems around the world caused by climate change. Park managers now must consider changes that have occurred not only in the past but also changes in the foreseeable future. The Friends of Acadia and Schoodic Institute have partnered with Acadia National Park staff to lead the way in managing for environmental change, using science-based management along with indigenous science.¹³

Human activities have contributed to several changes occurring throughout Acadia National Park. Many of the natural areas in the park have been degraded by visitor impacts or construction activities. The park’s natural flora has also been substantially impacted by humans bringing in non-native species. Around a third of the parks’ flora is non-native, and some of these species are extremely invasive which threatens the natural communities. Non-point source pollution is also impacting the park’s waters, which, in turn, impacts the ecosystems of

¹² Ibid

¹³ Ibid

the park. Climate change is also impacting the park. Climate fundamentally controls the distribution of ecosystems, species ranges, and process rates on earth, like erosion and glaciation, meaning changing climate will impact all these systems.¹⁴ Park managers are adapting to the impacts of climate change in the park, including rising sea levels, and more extreme storms, heat, and drought.¹⁵ With multiple threats already impacting the park's ecosystems, it is important to reduce future threats that may put the park and its ecology at further risk.

Maine's Fishing Heritage

Maine's coastal fishing heritage, especially the lobster fishery, holds high historical and community value in the towns surrounding Frenchman Bay. Numerous families spanning multiple generations inhabit these coastal villages on land that has been passed down from their ancestors. The fishing industry serves as a primary source of income for many residents. For generations, Maine fishermen have fostered a tradition of collaboration to ensure the sustainability of the fishery, which depends on a healthy ecosystem. Maine's lobster fishery is currently facing increasing environmental pressures that threaten Maine's coastal fishing heritage. Many scientists, managers, and fishermen are concerned about changing habitat conditions for the American Lobster such as warmer water temperatures, hypoxia, and other stress factors resulting in die-offs.¹⁶ Other fisheries and small-scale aquaculture farms also depend on a healthy ecosystem including mussels, oysters, seaweed, and scallops.

The health and biodiversity of Maine's coast have significant impacts on not only local communities but also the entire state's economy. In 2021, Maine's commercial fisheries brought in \$890 million in revenue.¹⁷ That same year, lobster catch alone brought in \$730 million in revenue to the state.¹⁸ Maine's established aquaculture operations also contribute to the state's economy. In 2021 Maine had almost 200 small-scale aquaculture leases bringing in around \$72 million in revenue.¹⁹ The fishing industry includes much more than just fishermen and supports an extensive value-chain in the regional economy; it includes seafood processors, supply shops, boat maintenance, and many other jobs related to fishing. In 2016, an economic impact study determined that Maine's lobster supply chain contributed \$967.7 million to Maine's economy and supported more than 5,500 jobs within the state.²⁰

¹⁴ Grimm et al., "Impacts of Climate Change."

¹⁵ Alicia Orr, "Presidential Views of Climate Change," 1.

¹⁶ NOAA, "American Lobster."

¹⁷ Maine DMR Open Data, "Maine Commercial Landings."

¹⁸ Maine DMR Open Data, "Historical Maine Lobster Landings."

¹⁹ Maine DMR Open Data, "Maine Commercial Landings."

²⁰ Donihue, "Lobsters to Dollars."

AMERICAN AQUAFARMS PROPOSAL

In October 2020, American Aquafarms, a company backed by Norwegian investors, announced their plans to build one of the world's largest net-pen salmon farms, potentially bringing new jobs and economic benefits to the local community and the state. The project was proposed to be located off the Maine Coast in Frenchman Bay, less than 2,000 ft from Acadia National Park.²¹ This aquaculture project would raise 66 million pounds of salmon annually in thirty 150' diameter pens at two different 60-acre lease sites. The pens would use a "semi-closed" technology that has never been used on this scale before.

Industrial-scale finfish aquaculture projects have the potential to be both economically and socially desirable when done right. It is important to confirm that a project's benefits outweigh the costs and that the costs and benefits are evenly distributed. As described later in this report, the American Aquafarms project proposal failed to account for all potential impacts on Maine's economy and ecosystems, and made unrealistic assumptions when describing the potential benefits to the local communities and economy. Many of American Aquafarms' project benefits would be partially or completely offset by the costs, potentially harming Maine's economy, ecosystems, and fishing heritage.

While the American Aquafarms project proposal is currently inactive, terminated by Maine Department of Marine Resources, additional lease applications of this scale are surely forthcoming.²² The following analysis is specific to the region immediately surrounding Frenchman Bay, however, the key points and considerations can inform future aquaculture lease applications in the region.

IV. Methods

Project Risks

American Aquafarms proposed an industrial-scale salmon aquaculture project which poses a significant threat to the area's renowned natural beauty and peaceful ambiance, and the tourism and recreation economy supported by these environmental amenities by bringing noise, light, air, and water pollution to the area. Small-scale commercial fisheries, like lobstermen and kelp farmers, are also at risk from industrial-scale aquaculture because they rely on a healthy coastal and marine environment.²³

²¹ Kochman et al., "Preventing Monster Fish Farms in Maine," 6.

²² Moore, "End American Aquafarms Application."

²³ Natural Resources Council of Maine, "Industrial Aquaculture Farm Not Appropriate for Frenchman Bay."

The installation and operation of the aquaculture project would create noise pollution that would impact both the tourism industry and fishing industry in and around Frenchman Bay. One of the proposed lease sites sits just 2400 feet from Acadia National Park, where many tour guides encourage visitors to experience the sounds of the natural world. A national study found that 91% of park visitors surveyed considered the enjoyment of natural quiet and the sounds of nature as compelling reasons for visiting national parks.²⁴ The noise pollution from this project also creates the potential for ecosystem disturbances that could significantly impact fishermen in nearby communities. Many marine animals and invertebrates rely on sound for survival by using it to communicate, navigate, and to detect predator and prey, which can all be impacted from anthropogenic noise.²⁵ A study found that anthropogenic noise is creating severe psychological, behavioral, and sensory impacts on marine invertebrates like lobster,²⁶ which consequently is creating ecosystem disturbances that impact fishermen.

The installation and operation of the project would also create light pollution both above and below the water. Finfish aquaculture uses underwater lights to enhance fish growth and above ground lighting including navigation lights, floodlights, walkway lights, and lighting for supply and service boats. This increase in light pollution would also impact the tourism industry as many tourists come to Acadia National Park to observe the night sky. Each year, around 5,000 visitors and 500 vendors participate in the Acadia Night Sky Festival to view the exquisite sights of the night sky. Acadia National Park is one of the few places in the world with low enough levels of light pollution that you can observe the Milky Way Galaxy and sometimes even the Northern Lights in the night sky. Light pollution contributes to the overall “skyglow” which is the brightened night sky that impacts the ability to stargaze.²⁷

Other significant risks associated with this project include water and air pollution that also have impacts on the tourism and fishing industry. American Aquafarms project would release 4.1 billion gallons of polluted wastewater daily.²⁸ This water would contain dissolved oxygen and phosphorus that would get trapped in the bay and negatively impact the ecosystem. Frenchman Bay is in a sheltered area, meaning the bay does not flush and the wastewater will build up over time. This threatens Frenchman Bay’s fragile ecosystem potentially creating die-offs in the fishery. Increased water pollution also impacts the tourism industry because water quality is a key determinant in the recreational use of marine waters. This includes beachgoing,

²⁴ Rouleau, “What’s at Risk? Coastal Tourism.”

²⁵ NOAA, “Underwater Noise.”

²⁶ Day et al., “Lobsters with pre-existing damage.”

²⁷ NPS, “Stargazing at Acadia”

²⁸ Kochman et al., “Preventing Monster Fish Farms in Maine,” 5.

wildlife viewing, canoeing, and kayaking. The American Aquafarms operations would also impair air quality through their diesel generators, trucks, boats, and aircraft which affects both the ecosystems at Acadia National Park and all people in the area.

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This study examines the potential economic impacts to the tourism and fishing industries and the communities that rely on them in the area surrounding the proposed American Aquafarms project in Frenchman Bay. Both industries are likely be impacted by an industrial-scale aquaculture project. It also examines how reliant the communities surrounding Frenchman Bay are on these industries, and describes the potential impacts from the proposed project. This analysis looks broadly across Maine’s ocean economy, which, by definition, relies on resources from the ocean. While there are potential benefits associated with industrial-scale aquaculture, there are also many potential costs to consider, making this economic analysis a crucial component in the decision-making process.

ECONOMIC ANALYSIS

Over the past 200 years, the economy of Maine has evolved in response to population growth, technological advancements, and global economic conditions. Changes have generally been gradual, with new industries emerging organically from the existing economy with deep roots in local resources, labor, and market dynamics.

American Aquafarms has proposed something very different. The radical discontinuity of introducing a massive foreign operation could greatly disrupt the normal progression of a thriving and varied local economy, undermining core industries.

This report examines two “basic” industries, which yield a net *inflow* of revenues to the region. Basic, or exporting, industries are important because they balance the *outflow* of funds for goods and services imported from outside the local economy.

First, we will look at the tourism and recreation industry. This basic industry provides services to visitors from other parts of the country and from around the world, resulting in a net inflow of revenues to coastal Maine. Second, we look at a more typical export industry—commercial fishing. In both cases, the aim is to shed light on the question that arises when considering the effects of disruptive change: what’s at stake?

The National Oceanic and Atmospheric Administration (NOAA) produces time-series data focused on six economic sectors that are dependent on the oceans and Great Lakes. These data, called Economics: National Ocean Watch (ENOW) are published for counties, states, regions, and the nation²⁹. Among the six sectors covered by NOAA’s ENOW data are two that are the subject of this report: tourism and recreation, and the “living resources” sector, which includes activities such as commercial seafood harvesting, seafood processing, and aquaculture.

The most commonly used ENOW data are its employment statistics. ENOW employment statistics are derived from the Quarterly Census of Employment and Wages (QCEW), published by the Bureau of Labor Statistics, covering more than 95 percent of U.S. jobs, and available at the county, state, and national level³⁰.

²⁹ National Oceanic and Atmospheric Administration. 2017. Frequent Questions, Economics: National Ocean Watch (ENOW) data. Available online at <https://coast.noaa.gov/data/digitalcoast/pdf/enow-faq.pdf>. Accessed on August 14, 2023.

³⁰ U.S. Bureau of Labor Statistics. 2023. Quarterly Census of Employment and Wages. Available at <https://www.bls.gov/cew/>. Accessed on August 14, 2023.

The QCEW-based ENOW data provide a good representation of five of the six ENOW sectors, including tourism and recreation. In the living resources sector, however, fewer than half of the jobs are held by employees with the remainder filled by self-employed workers. These self-employed workers are primarily engaged in seafood harvesting and, instead of receiving a wage, usually receive a portion of the total value of the catch.

NOAA publishes a complementary version of ENOW with statistics for self-employed workers. These data, called ENOW for Self-Employed Workers, are based on the U.S. Census Bureau's Nonemployer Statistics (NES)³¹ that provide "economic data for businesses that have no paid employees and are subject to federal income tax³²." The total number of jobs in the living resources sector is represented by the sum of employees and self-employed workers reported by the two complementary ENOW datasets.

The processing and release of NES by the Census Bureau was delayed by issues related to the COVID-19 pandemic. Because of this delay and because an accurate characterization of Maine's living resources sector required the use of ENOW for Self-Employed Workers, which are derived from the NES, this analysis reflects the most recent year for which all data were available at the time of publication (2019).

COMMUNITY VULNERABILITY ANALYSIS

To conduct the community vulnerability analysis, the research was split into two phases. The first phase of involved collecting background data and information about the Frenchman Bay area. The second phase of our research involved talking to locals about our findings and asking their opinions on the topic.

The methodology was based on the *Development of Social Indicators of Fishing Community Vulnerability and Resilience in the U.S. Southeast and Northeast Regions* report which develops social indicators of fishing communities' vulnerability and resilience. This paper develops a comprehensive set of social indicators that can be used in fisheries' social impact assessments at a local level.³³ The study gathered data from over 2,900 coastal communities in 19 states spanning from Maine to Texas, creating 14 localized social vulnerability and fishing dependence indices. The data used in creating these indices primarily came from government sources to ensure the feasibility and replicability of the study.

³¹ National Oceanic and Atmospheric Administration. 2023. ENOW for Self-Employed Workers. Available at <https://coast.noaa.gov/digitalcoast/data/enow-nes.html>. Accessed on August 14, 2023.

³² U.S. Census Bureau

³³ Jepson et al., "Development of Social Indicators," 8.

To measure well-being, the study provides a well-being and fisheries conceptual model to help measure quality of life (See **Error! Reference source not found.**)³⁴.

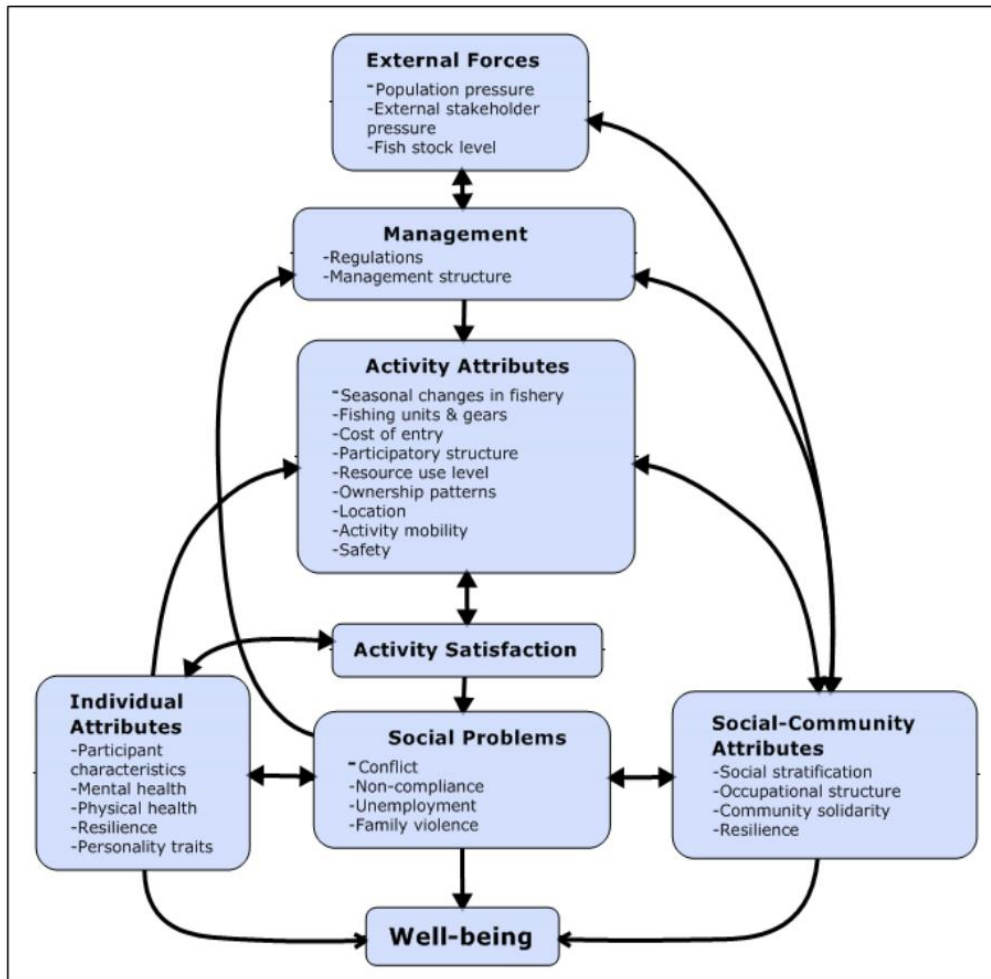


Figure 5. Well-being and Fisheries SIA Conceptual Model

This conceptual model visually represents the interconnections among various attributes that directly and indirectly impact well-being, both at the individual and community levels. While both individual and community attributes are important to overall well-being in fishery management, individual data is much harder to access. All components in this model ultimately impact well-being, which is important to remember while conducting a community-dependent analysis. While this model was useful to reference throughout our research, we were not able

³⁴ Pollnac et al. (2006)

to completely replicate it due to the lack of available individual attribute data and the time constraints of our analysis.

There are potential difficulties that may arise when trying to replicate the SIA Conceptual model (See Figure 5). The Vulnerability and Time Series Model (See Figure 6)³⁵ was created to help eliminate difficulties with replication.³⁶

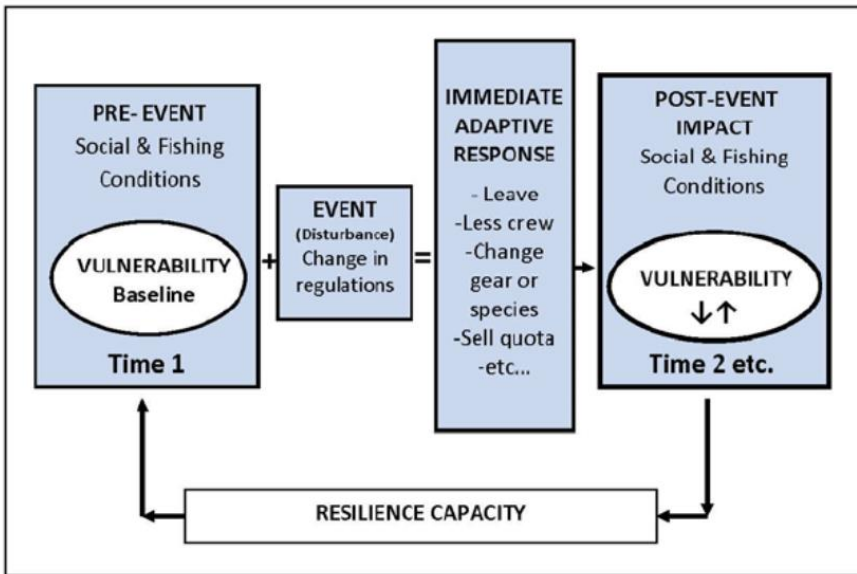


Figure 6. The Vulnerability and Resilience Time Series Model

This model was used in the study to test social indicators and provide a framework for interpretation of results.³⁷ The study provides 14 indicators divided into various categories including fishing engagement & reliance, environmental justice, climate change, economic, and gentrification pressure indicators.

These indicators were created to measure well-being, vulnerability, and resilience in fishing communities. These three factors are very heavily correlated and impact a fishing communities' ability to adapt to any disruptive events, such as an industrial-scale aquaculture project being built in Frenchman Bay. The ability to adapt to change relies on the interconnectedness among individuals, families, and external circumstances' that all correspond to a community's well-being.³⁸

³⁵ Jepson et al., "Development of Social Indicators," 4.

³⁶ Ibid.

³⁷ Ibid

³⁸ Mederer, "Surviving the Demise of a Way of Life."

After gaining a better understanding of all the social indicators developed to determine fishing community vulnerability and resilience, the next step was to determine which communities would most likely be impacted by an industrial-scale aquaculture project in Frenchman Bay. To start, census data was collected on communities as far west as Swans Island, ME, and as far east as Milbridge, ME. While these communities are not all directly adjacent to Frenchman Bay, this would give a general sense of what is occurring in on all nearby communities before eliminating them from the analysis. The initial data collected included town populations, median household income, unemployment rate, and other US Census data to help get a better understanding of these towns.

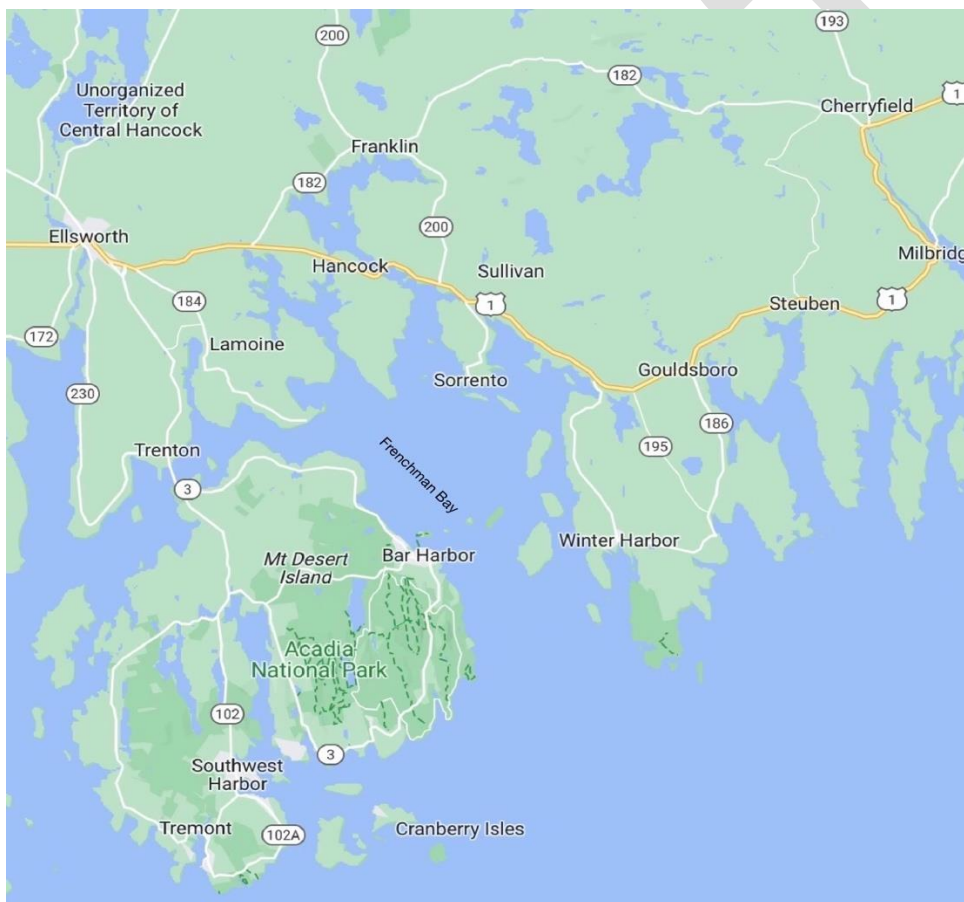


Figure 7. Map of Communities Surrounding Frenchman Bay

The communities that were selected, based on geographic proximity to Frenchman Bay, were Bar Harbor, Winter Harbor, Sorrento, Trenton, Lamoine, Gouldsboro, Hancock, and Sullivan (See Figure 7)³⁹. For these towns, additional data was collected using NOAA Snapshots of Human Communities and Fisheries in the Northeast.⁴⁰

After determining the presumed most important communities to look at based on their reliance on Frenchman Bay, the Development of Social Indicators report⁴¹ was used to select which social indicators would be most important to utilize for the study. The first indicators the study looks at are commercial fishing reliance and labor force structure. Together, these indicators show how important fishing is to a community and the stability of the workforce in a community.

Commercial fishing reliance measures the presence of commercial fishing in relation to the population size of a community through fishing activity. A high rank indicates more reliance which also means these places are more vulnerable to any changes that could cause fluctuations in harvest.⁴² Labor force structure characterizes the availability of employment. A high rank indicates fewer employment opportunities and a more vulnerable population.⁴³ Commercial fishing reliance was used for the analysis because it directly outlines which communities currently rely on commercial fishing the most. While this risk factor is very important, it is not enough to look at alone. Labor force structure was also used for the analysis because it creates an understanding of how many employment opportunities are available in the area. A community with a high fishing reliance and high labor force structure would be the most at risk.

These risk factors are of high importance for the research because not only do they show which communities rely the most on commercial fishing, but they also show the availability of other employment opportunities. While looking at commercial fishing reliance is the most straightforward approach to seeing which communities rely on the fishing industry, it doesn't convey the full story. Adding labor force structure to the analysis shows which communities have more employment opportunities, meaning if jobs were lost in the fishing industry, people would be able to find employment elsewhere. The fishing industry faces considerable

³⁹ Google Maps, "Frenchman Bay."

⁴⁰ NOAA, "Snapshots of Human Communities."

⁴¹ Jepson et al., "Development of Social Indicators,"

⁴² NOAA, "Social Indicators for Coastal Communities."

⁴³ Ibid

uncertainty from unanticipated fluctuations in harvest, so a fishing communities' ability to respond and adapt to change is very important.

Another important risk factor used in the analysis is commercial fishing engagement. This measures the presence of commercial fishing activity through permits, fish dealers, and vessel landings.⁴⁴ This risk factor also has impacts on a community's ability to respond and adapt to change.

The fourth important risk factor used in the analysis is housing characteristics. The housing characteristics variable is a measure of the infrastructure vulnerability to coastal hazards including median rent and mortgage, number of rooms, and presence of mobile homes. A high rank means more vulnerable infrastructure and a more vulnerable population.⁴⁵ This is important to consider because the stability of affordable housing also plays a role in a community's overall well-being.

Engagement with Local Residents

After coming to initial conclusions about the communities most vulnerable to changes in the fishery, the next step was to talk with locals from Maine to compare findings with their experiences. Two community discussion meetings (focus groups) were hosted, one in Bar Harbor and the other in Winter Harbor, on the potential effects of finfish aquaculture. The Bar Harbor meeting had the option to zoom into the discussion while the Winter Harbor discussion was all in person. All local residents were invited to the community discussions; however, the primary target audience was Maine fishermen and those in the tourism and recreation industry. The Bar Harbor meeting had about one dozen participants in person and about one dozen participants through Zoom. The Winter Harbor meeting had 12 participants, all in person. The main goal of the meetings was to gain a better understanding of how the communities surrounding Frenchman Bay and the fishing industry could be affected by a large-scale finfish aquaculture project.

The meetings began with an icebreaker, followed by a brief introduction of the research team, and a description of the purpose of the research. After brief introductions, initial research findings were shared with the audience and the floor was opened for discussions either confirming or denying the findings presented. Finally, to conclude the meeting, the audience was asked various questions about their current lifestyles and experiences working in the fishing industry to gain a better understanding of the community's reliance on the fishing

⁴⁴ Ibid

⁴⁵ Ibid

industry and the health of Frenchman Bay. See Appendix. Community Discussion Questions for a full list of questions.

The community discussions helped add a better local perspective of the communities surrounding Frenchman Bay to the analysis. The community discussion also provided contacts to further discuss the threats facing the Bay in more detail. After the meetings, the research team spoke with three individual lobstermen by phone to learn more about their fishing background and their opinions on the potential implementation of industrial-scale finfish aquaculture projects in Frenchman Bay.

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V. Analysis

[Marine planning] involves characterizing the potential socioeconomic consequences of locating one or more human uses in place of others in the coastal ocean. ...When implementing [marine planning], it is critically important to characterize not only the distribution of effects over the coastal ocean but also the distribution of impacts on coupled human communities onshore, including those communities that may not be considered strictly coastal.⁴⁶

American Aquafarms proposed to build the largest aquaculture operation in Maine, which would bring new jobs and economic benefits to both the local community and the state. However, for such a proposal to be economically and socially desirable, two essential conditions must be met. First, the benefits that are generated should outweigh the costs that are incurred. Second, these benefits and costs must be distributed fairly. American Aquafarms failed to demonstrate that either of these conditions would be met, and there are valid reasons to believe it would fall short on both accounts.

While the development would indeed create benefits, those benefits would be offset, partially or completely, by costs. Local communities and businesses would bear many of those costs, rather than the company. The proposed large-scale aquaculture operation in Frenchman Bay would lead to pollution of water, air, and light, along with noise, and negative visual impacts. This would directly impact the profitability of local businesses, including coastal tourism and recreation, commercial fishing, and small-scale aquaculture enterprises. The cost to these local businesses must be considered as an offset to the anticipated benefits of this aquaculture development.

Frenchman Bay, the chosen site for American Aquafarms' operations, is adjacent to Acadia National Park, a cherished and protected natural area. Acadia is a special place. With the National Park Service protecting the ecological integrity, cultural history, scenic beauty, and scientific values of the land, Acadia National Park features unique landscapes, diverse habitats, and transformative experiences that influence millions of tourists annually⁴⁷. The impacts of large-scale aquaculture in Frenchman Bay to the park and the local economy could be substantial.

⁴⁶ Hoagland et al., "Approach for Analyzing Spatial Welfare."

⁴⁷ National Park Service, "Foundation Document Overview Acadia National Park."

In 2022, nearly 4 million visitors to Acadia National Park added \$479 million to the local economy in the form of visitor spending, supporting nearly 7,000 jobs and contributing \$691 million to the national economy.⁴⁸ Non-local visitors account for about 98 percent of this spending.⁴⁹

In short, people from other parts of the country and from around the world visit Acadia National Park, bringing significant revenues to hotels, restaurants, campgrounds, kayak rentals and other recreational vendors, retail shops, grocery stores, and other local businesses. The visual impacts of thirty pens capable of producing 66 million pounds of salmon each year would spoil the natural vistas that attract visitors to the Maine coast. The cost to these local businesses must be considered as an offset to the anticipated benefits of this aquaculture development.

American Aquafarms' failure to account for or honestly assess the potential negative impacts on existing businesses in Maine makes it impossible to determine whether their project would generate overall benefits exceeding the costs. Many of these businesses are family-operated and have been part of the region's economy for generations. Yet, they are facing the burden of the development's costs without sharing in its revenues.

Thus, it is evident that American Aquafarms' project not only lacks evidence of generating net benefits but also highlights an unfair distribution of benefits and costs. Local businesses bear the brunt of the development's impacts while receiving little of the revenues it may generate. This is an example of what economists call an "externality." An externality occurs when a business causes someone else to pay part of the cost of their operations. *When American Aquafarms generates water, air, light, and noise pollution and the negative visual impacts that hurt local businesses, they have "externalized" part of their cost of doing business. Local businesses pick up part of the tab in the form of lost revenues.*

...for such a proposal to be economically and socially desirable, two essential conditions must be met. First, the benefits that are generated should outweigh the costs that are incurred. Second, these benefits and costs must be distributed fairly. American Aquafarms failed to demonstrate that either of these conditions would be met, and there are valid reasons to believe it would fall short on both accounts.

⁴⁸ <https://www.nps.gov/acad/learn/news/20230830.htm>

⁴⁹ National Park Service, "2021 National Park Visitor Spending Effects."

Maine residents would also pick up part of the tab. Although many of the costs to residents would not be financial in nature (and those that are financial in nature are less direct and harder to measure), the development would negatively impact the amenities that make Maine a desirable place to live. This loss of well-being and quality of life is a cost to Maine residents.

The unfair distribution of benefits and costs is evident as businesses already operating in Maine would pay for the development in lost revenues and Maine residents pay for the development in diminished well-being and quality of life.

To fairly assess the American Aquafarms proposal or others like it, it is important to remember the costs that these developments impose on the local business community and residents. We should ask ourselves, “What’s at stake?” The remainder of the Analysis section focuses on this question.

We will examine the total economy of Maine’s coast and the ocean-based segment of the economy. Then, we will turn to the tourism and recreation sector, which provides a substantial part of Maine’s economic base. We will then look at commercial fishing (another important part of Maine’s economic base), fishing communities, and the importance of scrutinizing benefits claimed by economic proposals with examples from the American Aquafarms documents.

WHAT’S AT STAKE: MAINE’S COASTAL AND OCEAN-BASED ECONOMIES

Economies are like agricultural endeavors; they grow gradually over time, facing setbacks and recovering while adapting to changing conditions. The economic relationships between producers and consumers, as well as suppliers, develop organically over long periods. Making large-scale "engineered" changes to an economy can disrupt these long-standing relationships between producers, consumers, and suppliers.

Maine's economy is mature and resilient. It successfully weathered the economic downturn in the late 2000s and is now navigating its way through the global COVID pandemic. Given its strength and resilience, there is much at stake in Maine's economy.

In 2007, the coastal counties of Maine, which heavily rely on the natural environments that would have been impacted by American Aquafarms, employed more than 602,000 people. Employment was stagnant in 2008 as the effects of the global financial crisis began to be felt. As conditions worsened, Maine experienced a decline in employment, reaching a low of 578,000 in 2010. The recovery was gradual as the previously robust economic relationships were

reestablished and began to grow. By 2019, Maine's economy had long since recovered, with 622,000 individuals employed (See Figure 8)⁵⁰.

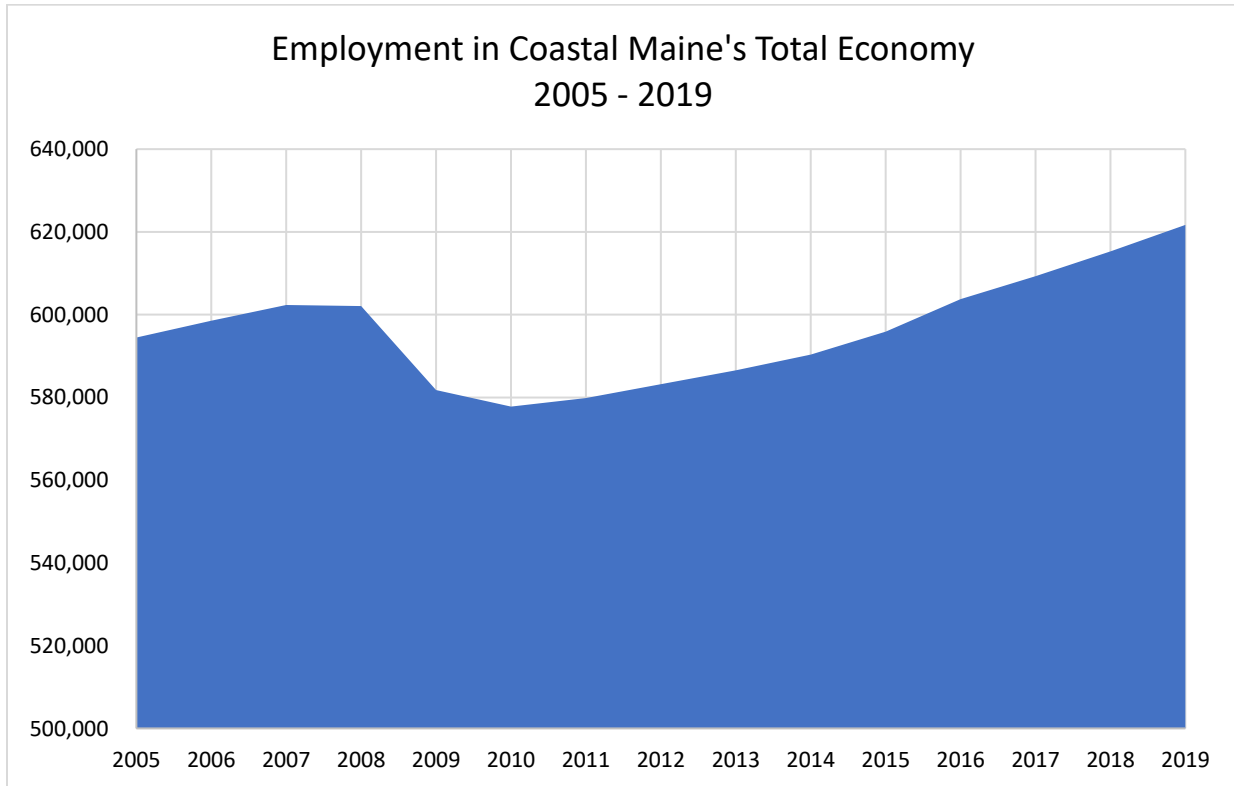


Figure 8. Employment in Coastal Maine's Total Economy 2005-2019

Maine's coastal region is made up of eight counties, with Cumberland County contributing over half of the total employment in 2019, followed by York County. Hancock County, where Frenchman Bay is located, ranked third, providing employment to 23,000 individuals (See Figure 9)⁵¹.

⁵⁰ Bureau of Labor Statistics. "(QCEW) Data."

⁵¹ Ibid.

Employment in Coastal Maine's Total Economy By County, 2019

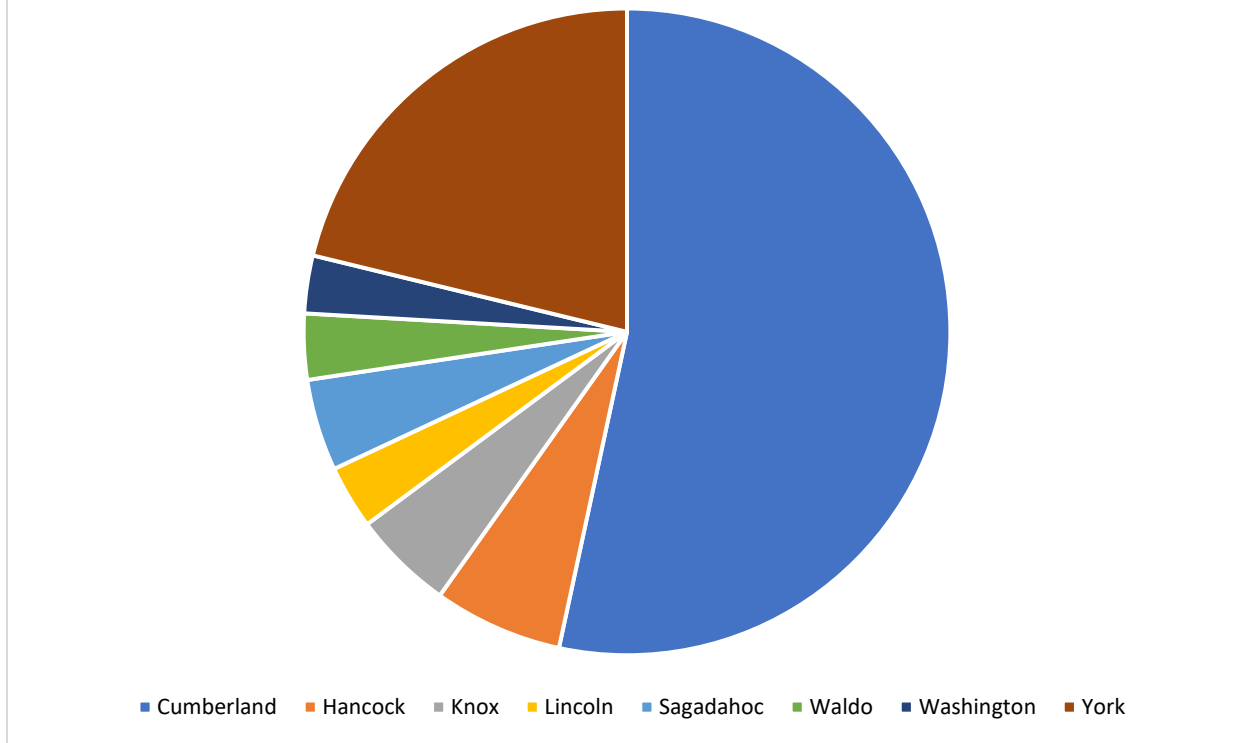


Figure 9. Employment in Coastal Maine's Total Economy by County, 2019

It is not surprising that a significant portion of Maine's coastal economy relies directly on the ocean. This "ocean economy" encompasses a wide range of activities that use ocean and marine resources as inputs (e.g., commercial fishing), where the goods or services that are produced are predominantly used in the marine setting (e.g., ship repairs), or where the geographic location of the economic activity implies a connection to the ocean (e.g., coastal tourism and recreation). Over the past decade, Maine's ocean economy has been growing and currently accounts for 8.6 percent of all employment in the eight coastal counties.

Economic activities within the ocean economy are often considered "basic," meaning that they generate substantial sales to customers outside the region. This brings in income from outside sources, which balances the outflow of funds to purchase goods from other regions (for instance, coastal areas with no dairy farms still need access to milk) and provides a strong foundation for the overall economy. Examples of basic industries include manufacturing (e.g., Bath Iron Works) and commercial fishing. On the other hand, typical examples of non-basic sectors include restaurants and retail shops. Because of Maine's coastal tourism and recreation

activities, however, these services are “exported” to tourists who visit the Maine coast, coming from other parts of the country and from around the world.

Maine's ocean economy has demonstrated resilience, with a 26 percent employment growth between 2005 and 2019, surpassing the growth of Maine's total state economy (5 percent). During the global economic crisis starting in 2008, employment in the ocean economy declined by only 2 percent, half the decline observed in Maine's state economy (See Figure 10).⁵²

In 2019, the top employers in Maine's Ocean economy were Cumberland County (with 35 percent of the employment in Maine's ocean economy), York County (29 percent), Sagadahoc County (12 percent), and Hancock County (9 percent) (See Figure 11).⁵³

The ocean economy's basic activity provides an inflow of income to the state and supporting the rest of Maine's economy. However, the American Aquafarms project would have negatively impacted the natural environment that plays a crucial role in key segments of Maine's ocean economy, notably the tourism and recreation sector and the commercial fishing sector, which will be discussed further in subsequent sections.

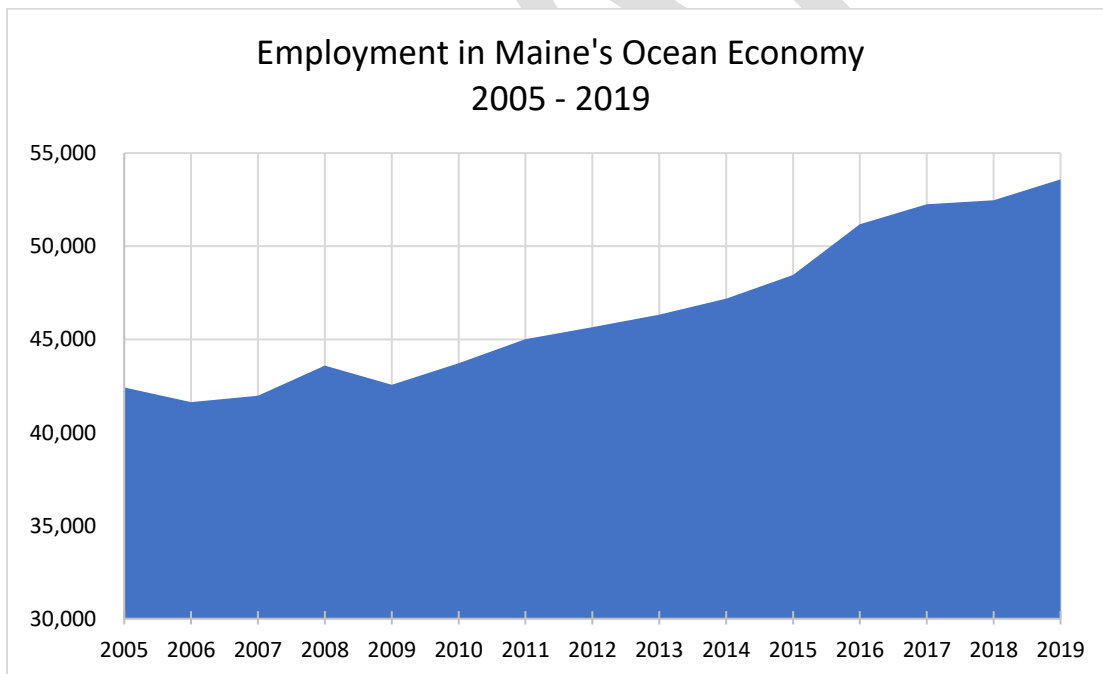


Figure 10. Employment in Maine's Ocean Economy 2005-2019

⁵² Ibid

⁵³ Ibid

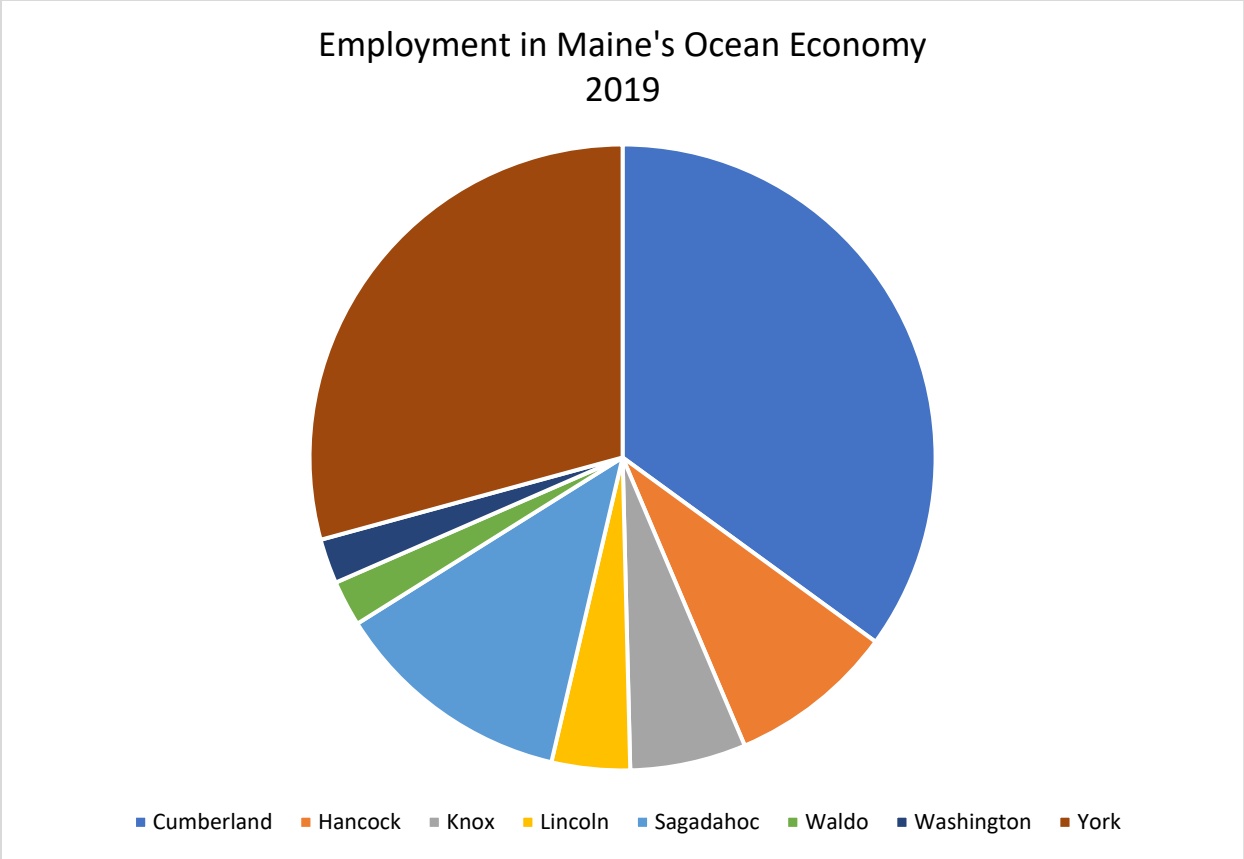


Figure 11. Employment in Maine's Ocean Economy, 2019

WHAT'S AT STAKE: THE TOURISM AND RECREATION SECTOR

The ocean economy's tourism and recreation sector encompasses a wide range of activities, but two industries stand out. Specifically, the two "tourism" industries—"Eating and Drinking Places" and "Hotels and Lodging Places"—account for 94 percent of employment in this sector. The wide array of "recreation" industries in this sector, which include marinas, RV parks, campgrounds, chartered boat trips, fishing excursions, and other recreational services, make up the remaining 6 percent.

This distinction is crucial because any environmental degradation can have far-reaching consequences on the entire sector. Both the hotels and restaurants, as well as the recreational activities that attract the visitors who patronize these establishments, could be adversely affected. *It highlights the interconnectedness between preserving the natural environment and sustaining the success of Maine's ocean economy's vital tourism and recreation sector.*

The tourism and recreation sector plays a critical role in Maine's ocean economy, constituting 63 percent of the total employment. Among the coastal counties, Cumberland County leads the way, contributing nearly half of the employment in this sector, while York County accounts for an additional quarter (See Figure 13).⁵⁴

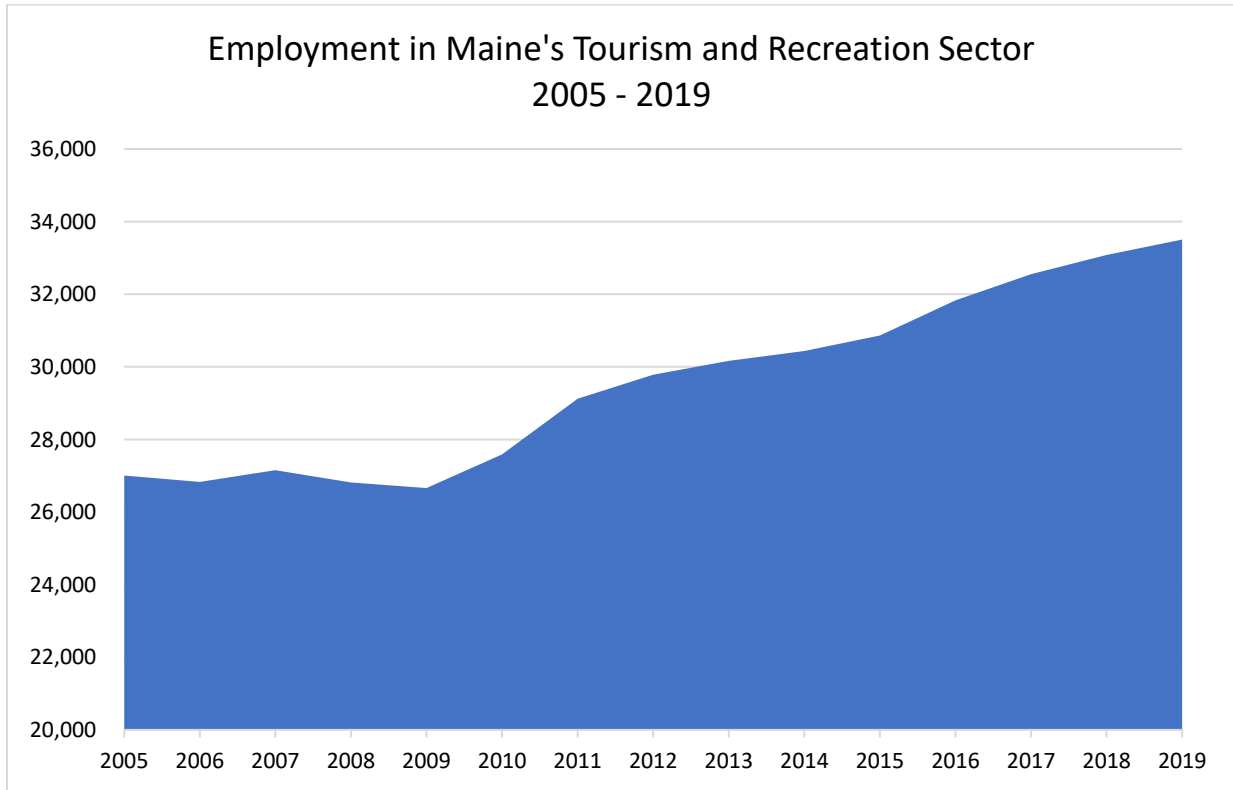


Figure 12. Employment in Maine's Tourism and Recreation Sector 2005-2019

⁵⁴ Ibid

Employment in Maine's Tourism and Recreation Sector 2005 - 2019

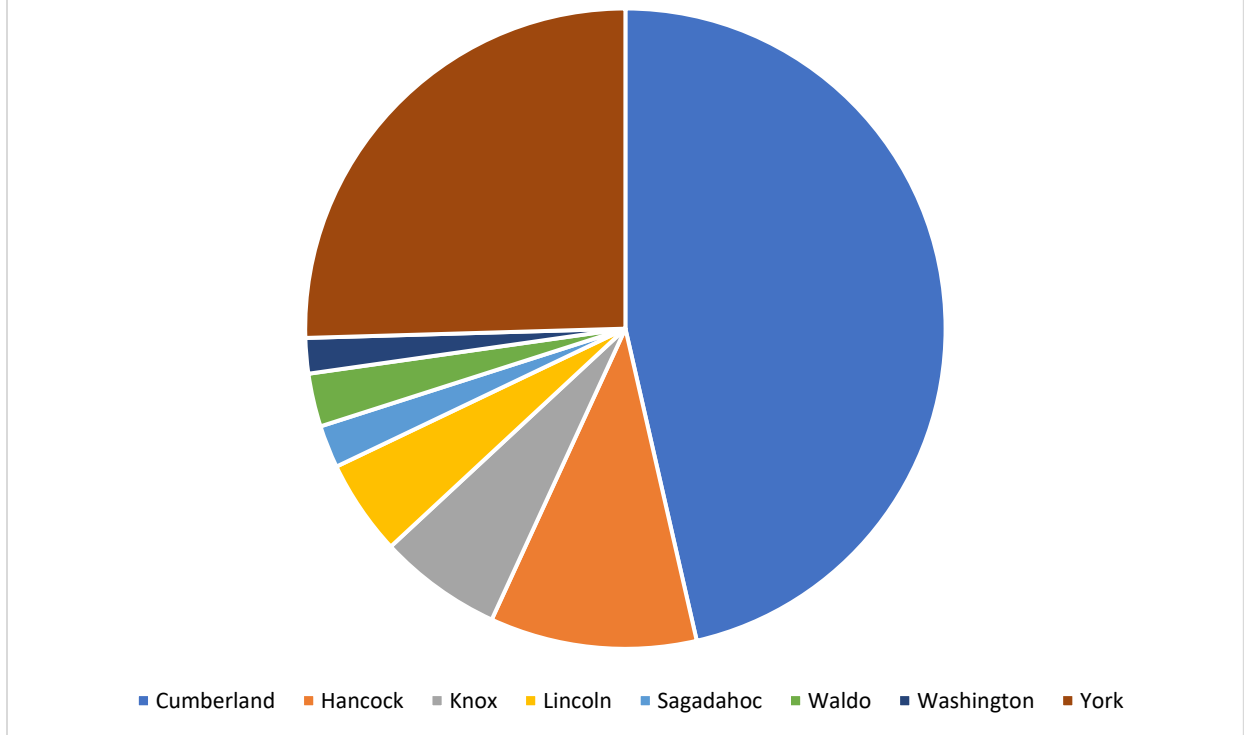


Figure 13. Employment in Maine's Tourism and Recreation Sector 2005-2019

Hancock County is the third largest employer in this sector. In 2019, the tourism and recreation industry in Hancock County, Maine employed 3,500 individuals, providing \$99 million in wages, and contributing \$244 million to the nation's gross domestic product (GDP). Additionally, self-employed workers in this industry generated \$6.1 million in gross receipts.⁵⁵

The distribution of recreation-related businesses in the area is as follows: Bar Harbor has 29 establishments, Gouldsboro has 5, Ellsworth has 6, Winter Harbor has 7, Trenton has 3, and Lamoine has 1.⁵⁶ These businesses offer various services, including scenic ferry, boat, and aircraft excursions, fishing trips, educational cruises (e.g., on lobster boats), canoe and kayak rentals, outdoor recreation outfitters, and camping/recreational vehicle rentals.

In the broader context of the tourism and recreation industry in the United States, there are 15 tourism-related jobs (hotels and eating and drinking establishments) for every recreation-

⁵⁵ NOAA, ENOW data

⁵⁶ Research by TBD Economics, 2022.

related job.⁵⁷ For the Frenchman Bay area, web-based booking services list 55 hotels and motels and over 1,000 bed and breakfast listings.⁵⁸

The allure of the Maine coast lies in its pristine natural environment and breathtaking scenic beauty, drawing visitors from far and wide. However, the pollution of water, air, and light, coupled with noise and negative visual impacts, would have a direct impact on recreation-related businesses. This will, in turn, adversely affect the hotels and restaurants in the area, underscoring the intricate link between safeguarding the natural environment and ensuring the continued prosperity of Maine's ocean economy, particularly its crucial tourism and recreation sector.

WHAT'S AT STAKE: THE COMMERCIAL FISHING SECTOR

The primary impacts of large-scale aquaculture on ocean tourism are related to aesthetic qualities. Visitors, especially those from urban areas, are attracted to Maine because of its clean air and water, tranquil environment, and the opportunity to experience dark night skies adorned with spectacular displays of the Milky Way and stars, which can be truly inspiring. The impacts on commercial fishing are very different. They are not related to aesthetics but rather to issues such as disease and mortality of seafood, as well as its suitability for consumption.

This analysis has, so far, characterized the coastal and ocean economies of Maine using employment statistics, ignoring the much smaller number of self-employed persons. In nearly all cases, the number of self-employed workers is too small to have any significant impact on assessments of the magnitude and relative importance an economic sector. However, in the case of commercial fishing, the situation differs significantly, as approximately half of the workers are self-employed.

In seafood processing plants and seafood wholesale and retail establishments, workers are typically employees of the establishments. However, in seafood harvesting, workers are not on a traditional payroll and do not receive salaries or wages. Instead, they are often compensated based on a share of the proceeds from the catch. The specific distribution of shares can vary in many ways, but crew members are generally considered self-employed workers in this context.

In this report, the term "commercial fishing" encompasses various activities, such as seafood harvesting, hatcheries, aquaculture, seafood processing, and wholesale and retail markets. In

⁵⁷ NOAA, ENOW data

⁵⁸ Research by TBD Economics, 2022

2019, the commercial fishing sector provided employment for a total of 9,095 individuals, consisting of 5,527 self-employed workers and 3,568 employees.

Over the years, the number of self-employed workers in this sector has experienced a gradual but consistent decline. In contrast, employment statistics remained stable from 2005 to 2015 and then saw an increase of more than 70 percent in 2016 and following years (See Figure 14). The reason for this sudden increase has not been identified yet, but it is likely due to the addition of one or more establishments in industries other than fish harvesting.

The importance of Maine's seafood industry is more obvious when viewed in terms of its economic impact. In 2021, this industry had an economic impact of \$1.6 billion across the state, excluding the activity associated with seafood imports. American lobster dominated the seafood landings, comprising 78 percent of the total, while other shellfish accounted for 13 percent, and finfish made up about 9 percent of the overall landings in terms of revenue. Over the past decade, seafood harvests experienced substantial growth, rising by nearly 50 percent between 2009-2016. Although there was a slight decline in the subsequent years, the industry remained robust, and bounced back after COVID to produce record landings of \$954 million in 2021.⁵⁹

⁵⁹ National Marine Fisheries Service, "Fisheries Economics of the United States."

Maine's Commercial Fishing Sector Employment and Self-Employed Workers 2005-2019

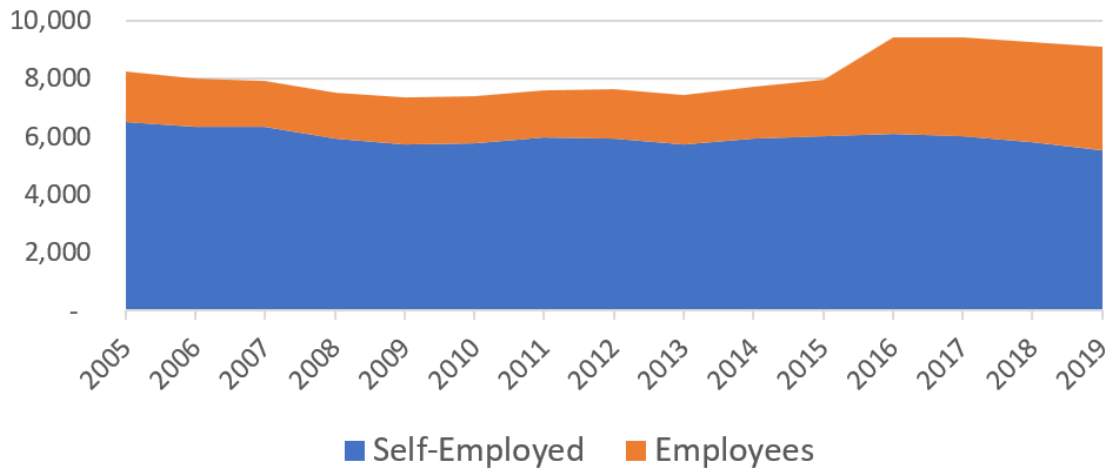


Figure 14. Maine's Commercial Fishing Sector Employment and Self-Employed Workers 2005-2019

Hancock County supports more fishing jobs than any other Maine county, followed by Washington, Cumberland, and Sagadahoc Counties. Statewide in 2019, self-employed workers accounted for 61 percent of commercial fishing jobs state-wide. Hancock County had an even higher proportion of self-employed workers, accounting for 70 percent of fishing jobs. Knox County had the highest proportion of self-employed workers in commercial fishing (89 percent) and Sagadahoc County had the lowest (fewer than 20 percent) (See Figure 15).⁶⁰

⁶⁰ Bureau of Labor Statistics. "(QCEW) Data."

Maine's Commercial Fishing Sector Employment and Self-Employed Workers By County, 2019

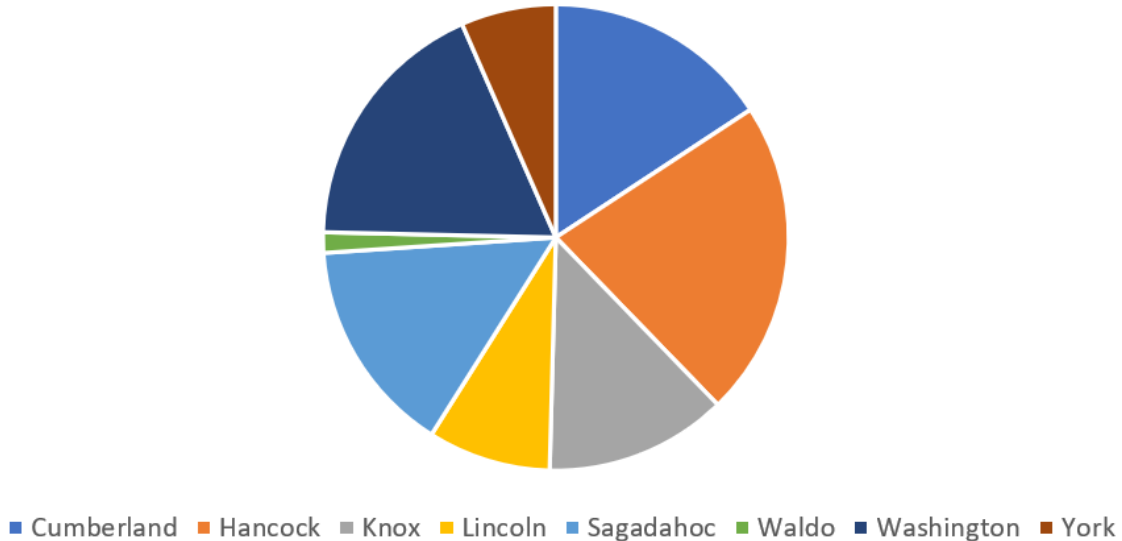


Figure 15. Maine's Commercial Fishing Sector Employment and Self-Employed Workers by County, 2019

Maine's economic reliance on commercial fishing is significant and, as will be shown in the next section of this report, there is also a deep historical and cultural connection to this industry. The potential impacts of a massive aquaculture operation in the heart of Maine's seafood harvesting region are currently unknown, but there is a significant possibility of harm arising from water pollution, disease, and interference with existing fishing operations. The commercial fishing sector is already grappling with other challenges, including the absence of local processing facilities and difficulties in hiring workers. Introducing an additional source of risk to this crucial industry is unacceptable.

WHAT'S AT STAKE: SMALL-SCALE AQUACULTURE

Maine's aquaculture industry is growing steadily and benefiting from innovation and research. Oysters and mussels were among the primary species being cultivated due to their popularity and ecological benefits. The state is also exploring the cultivation of kelp and sea vegetables, driven by rising demand for sustainable seafood and the state's favorable coastal conditions.

Maine offers several types of aquaculture licenses, each tailored to different species and farming methods. These include Limited Purpose Aquaculture (LPA) licenses for low-impact shellfish and seaweed cultivation (up to 400 square feet), Experimental Aquaculture (EA) licenses for research and development (up to 4 acres), and Standard Aquaculture (SA) licenses for larger-scale operations (up to 100 acres).

The total number of active aquaculture businesses was 904, and the total acres leased was approximately 1,660 in 2021. The sizes of these businesses ranging from small family-owned operations to larger enterprises. Currently, 90% of all the active marine aquaculture sites in Maine are under 4 acres, including the 745 sites with Limited Purpose Aquaculture (LPA) licenses and 72 of the 159 sites with Experimental Aquaculture (EA) or Standard Aquaculture (SA) licenses. Almost all the fast-growing kelp and algae cultivations are in small sites.⁶¹

Small marine aquaculture operations have some advantages over large farms. They tend to have lower environmental impacts since they often use less space and resources. Small-scale operations can also have a more localized focus, which can directly benefit local jobs, revenues, and communities. On the other hand, large marine aquaculture farms may have economies of scale, enabling them to produce more efficiently and at lower costs. However, they can also pose greater

LARGE-SCALE VS. SMALL-SCALE AQUACULTURE

...large marine aquaculture farms may have economies of scale, enabling them to produce more efficiently and at lower costs. However, they can also pose greater environmental risks due to their larger scale... High stocking densities can promote disease outbreaks among farmed fish, requiring the use of antibiotics that can contribute to antibiotic resistance. Improper waste disposal and habitat destruction associated with large-scale aquaculture can further degrade coastal and marine environments. This is a key consideration for places that depend heavily on tourism and commercial fishing.

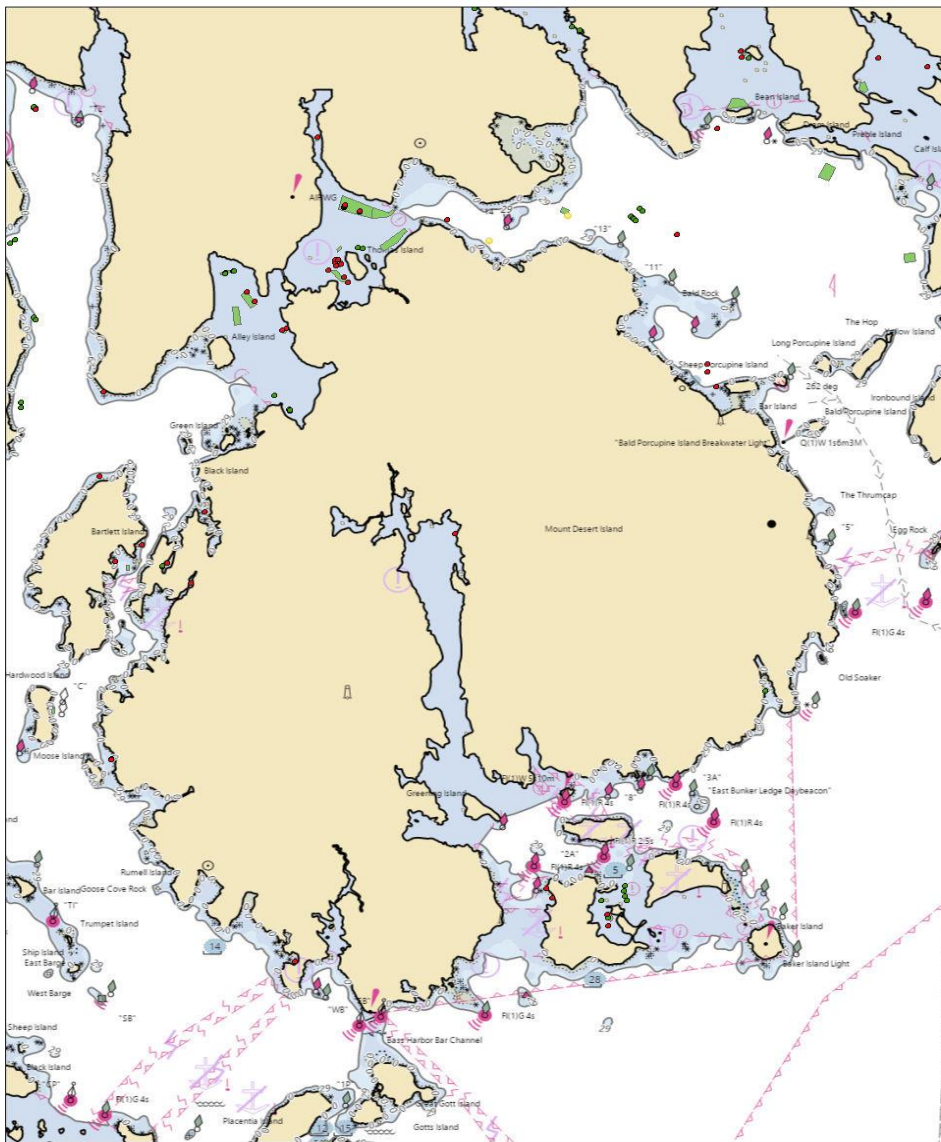
⁶¹ Maine Department of Marine Resources Open Data Portal, accessed by 8/15/2023

environmental risks due to their larger scale, potentially leading to more significant pollution and habitat disturbances. High stocking densities can promote disease outbreaks among farmed fish, requiring the use of antibiotics that can contribute to antibiotic resistance. Improper waste disposal and habitat destruction associated with large-scale aquaculture can further degrade coastal and marine environments. *This is a key consideration for places that depend heavily on tourism and commercial fishing.*

As shown in Figure 16, there are already more than 30 small aquaculture sites and approximately 14 active large-scale farms nearby the Bar Harbor surrounding areas. New additions of large-scale farm will exacerbate the competition for suitable coastal areas. Balancing the benefits of scale with the need for sustainability and environmental protection is a key challenge in Bar Harbor's marine aquaculture management.

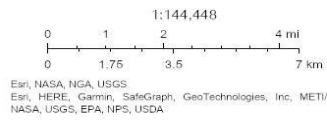
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ArcGIS Web Map



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- Approximate Center Point of Lease Applications Under Review
- Limited Purpose Aquaculture (LPA) Licenses
 - Active
 - Terminated
- Active or Pending Aquaculture Leases
 - Active



Web AppBuilder for ArcGIS
 Esri, NASA, NGA, USGS | Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, EPA, NPS, USDA | MaineDMR, MaineGeoLibrary | MaineDMR, Maine GeoLibrary |

Figure 16. Current aquaculture leases

WHAT'S AT STAKE: MAINE'S FISHING HERITAGE

Hancock County, surrounding Frenchman Bay, is heavily reliant on marine resources, making it particularly vulnerable to environmental impacts. Marine businesses are especially vulnerable due to limited relocation options. The marine economy in Hancock County includes 561 businesses and 6,230 total jobs, making up 20.3% of the total employment in the county.⁶² In 2020, Hancock County's total wages from living resources was \$24.6 million.⁶³ Living resources include commercial fishing, fish hatcheries, aquaculture, seafood processing, and seafood markets.⁶⁴

The community vulnerability analysis mainly focuses on eight towns directly adjacent to Frenchman Bay including Bar Harbor, Winter Harbor, Sorrento, Trenton, Lamoine, Gouldsboro, Hancock, and Sullivan. These towns are all in Hancock County and are census-classified rural areas except for Bar Harbor which is a census-classified urban cluster. More urbanization indicates that a community has more jobs overall, more kinds of jobs, and more services like hospitals, social workers, and job training centers. The eight towns directly surrounding Frenchman Bay are rural, and therefore more at risk from any changes in the fishing industry causing the need for individuals to find work elsewhere in the community.

Social Indicators for Coastal Communities

NOAA Fisheries social indicators can be used to assess the well-being of coastal communities engaged in commercial fishing activities. The analysis utilized the NOAA Fisheries Community Social Vulnerability Indicators Toolbox and indicator map to analyze community vulnerability to any changes in the marine economy.

⁶² NOAA, "ENOW Explorer Wages."

⁶³ NOAA, "Total Coastal Economy."

⁶⁴ Ibid

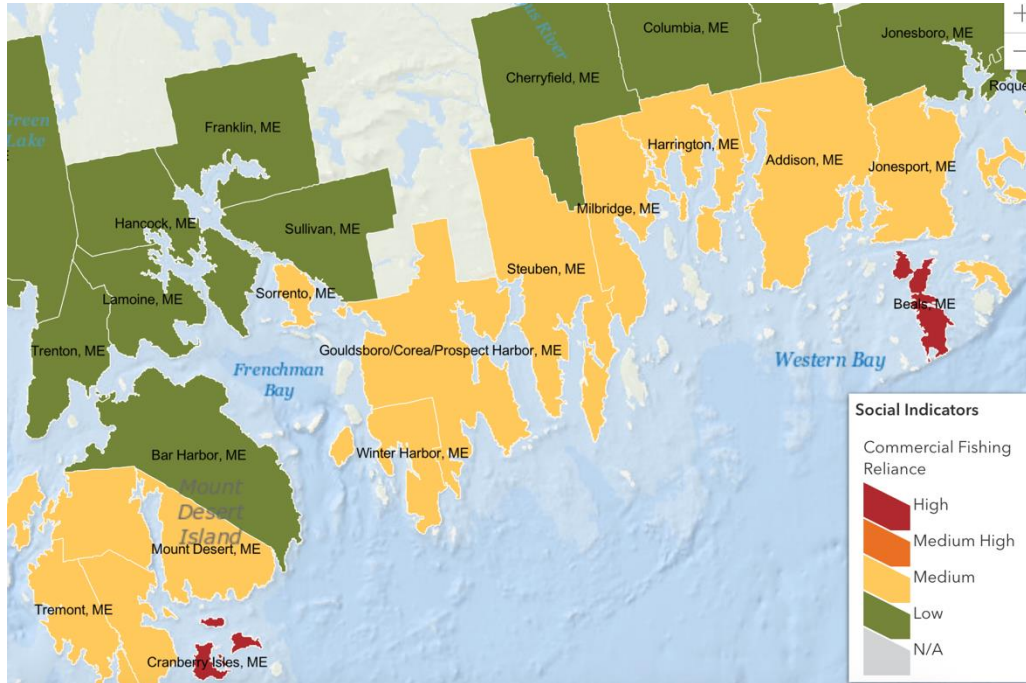


Figure 17 - Commercial fishing reliance map, 2020

Figure 17⁶⁵ shows commercial fishing reliance in communities surrounding Frenchman Bay from 2020. Commercial fishing reliance is calculated by the presence of commercial fishing in relation to the population size of a community. A higher rank indicates more reliance on commercial fishing and more vulnerability to any changes. Figure 17 indicates that Winter Harbor, Sorrento, and Gouldsboro have medium commercial fishing. This suggests that changes in commercial fishing such as fluctuations in harvest will have the most impact on these three communities.

⁶⁵ NOAA, "Social Indicators for Coastal Communities."

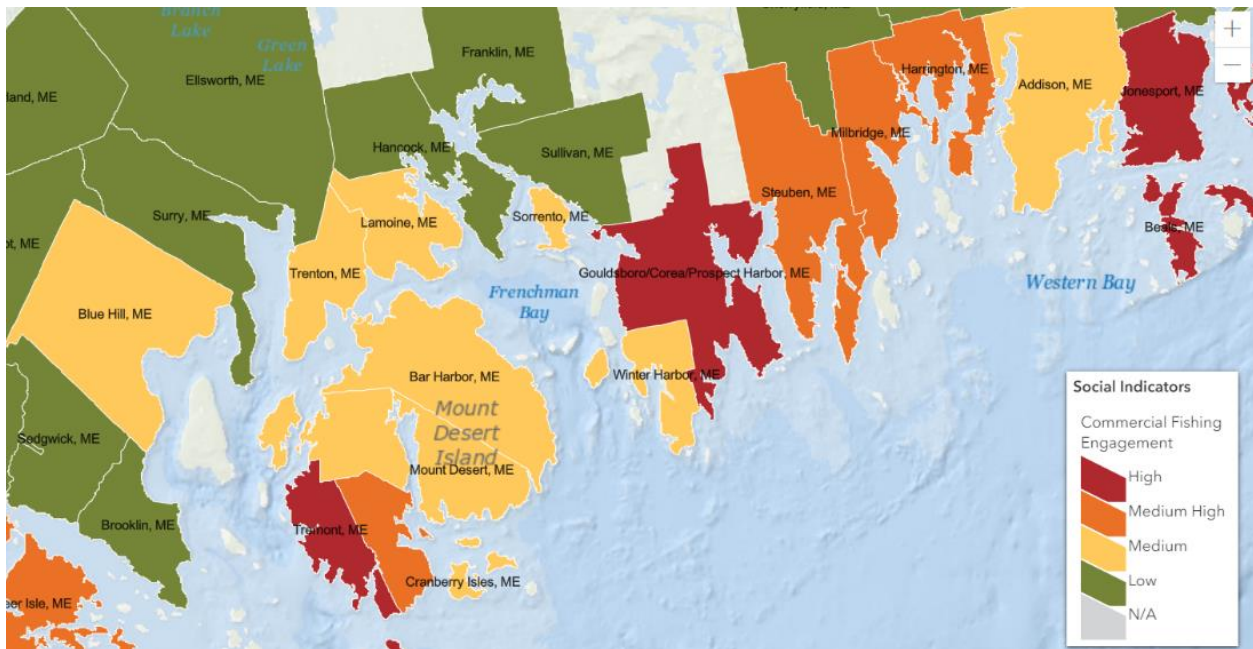


Figure 18 - Commercial fishing engagement map, 2020

Figure 18⁶⁶ shows commercial fishing engagement in communities surrounding Frenchman Bay. Commercial fishing engagement measures the presence of commercial fishing activity. This is determined by permits, fish dealers, and vessel landings. A higher rank indicates more fishing engagement. Figure 18 indicates that in 2020, Gouldsboro had the highest commercial fishing engagement, followed by Winter Harbor, Sorrento, Lamoine, Trenton, and Bar Harbor which had medium commercial fishing engagement.

⁶⁶ NOAA, "Social Indicators for Coastal Communities."

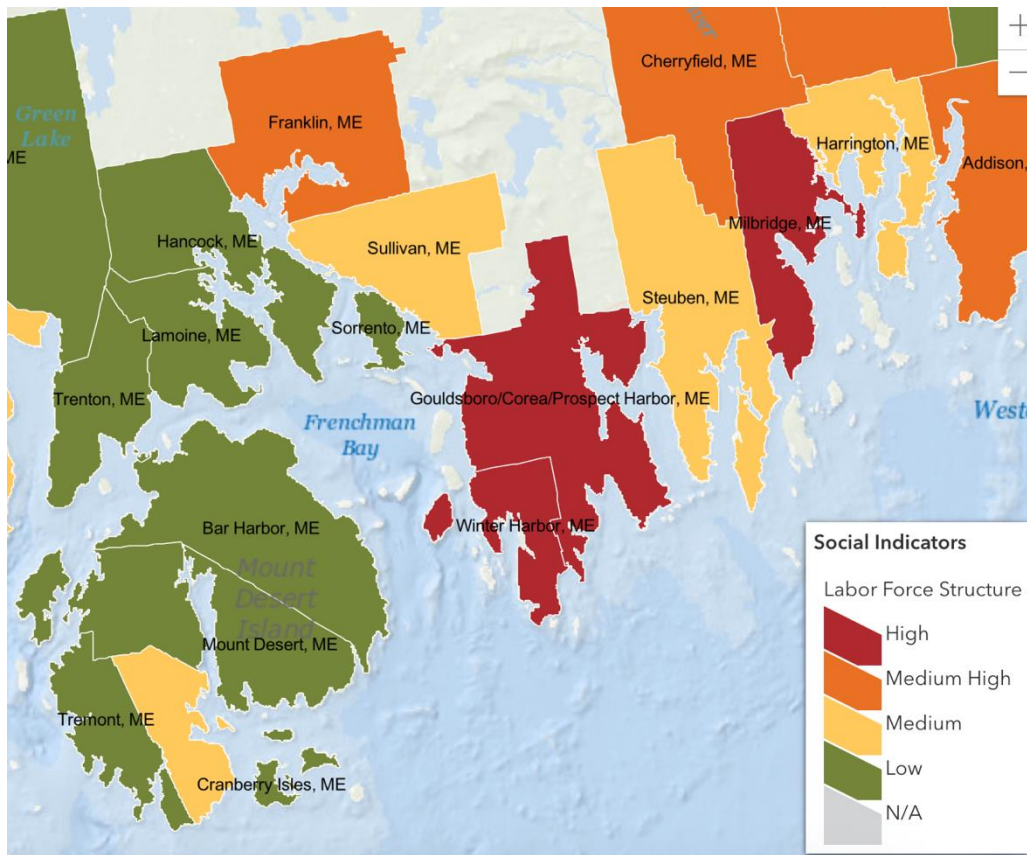


Figure 19 – Labor force structure map, 2020

Figure 19⁶⁷ shows the labor force structure in communities surrounding Frenchman Bay. Labor force structure rank is determined by the availability of employment including types of employment opportunities. A higher rank indicates fewer types of employment opportunities while a lower rank indicates more employment opportunities characterizing a diverse and stable workforce. Figure 19 illustrates that Gouldsboro and Winter Harbor have a high labor force structure with a low diversity of employment opportunities. Sullivan has a Medium score in labor force structure, meaning it also has fewer types of employment opportunities.

⁶⁷ NOAA, “Social Indicators for Coastal Communities.”

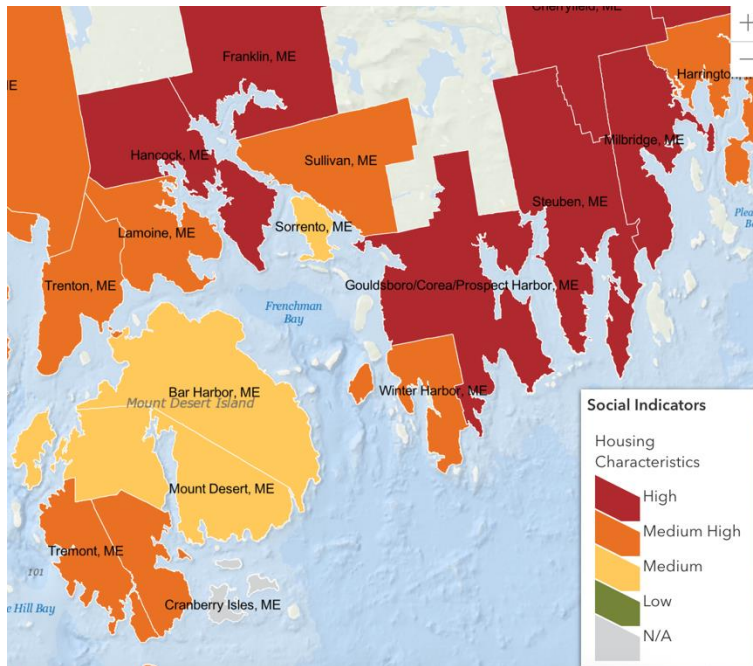


Figure 20 – Housing characteristics map, 2020

Figure 20⁶⁸ shows housing characteristics in communities surrounding Frenchman Bay. The housing characteristics indicator is measured by infrastructure vulnerability to coastal hazards including median rent and mortgage, number of rooms, and presence of mobile homes. A higher rank means the population is more vulnerable. This map shows that all eight communities we are focusing on are somewhat vulnerable to fluctuations that may cause a decrease in safe affordable housing. According to Figure 20 Hancock and Gouldsboro are the most vulnerable populations when it comes to affordable housing, followed by Sullivan, Lamoine, Trenton, and Winter Harbor.

Figure 17, Figure 18, Figure 19, and Figure 20 all demonstrate that communities east of Frenchman Bay are heavily reliant on fishing-related businesses and therefore would be highly impacted by any substantial changes that may occur in the fishery. Changes in the fishing industry occur for numerous reasons including those related to the health of the resource—environmental factors, overfishing, and pollution, and those related to the health of the industry—supply, demand, and price. Communities most dependent on fisheries are most vulnerable to any changes that impact the health of fisheries because unhealthy ecosystems can lead to lower fish populations. Low fish populations make it extremely difficult for commercial fishermen to make a living, therefore forcing them to look for employment elsewhere. In this case, the communities most reliant on commercial fishing also have a higher

⁶⁸ NOAA, “Social Indicators for Coastal Communities.”

labor force structure meaning that there aren't many other employment opportunities. If any major changes occur in Frenchman Bay, like an industrial-scale finfish aquaculture farm being implemented, many fishermen in Sorrento, Gouldsboro, and Winter Harbor run the risk of losing their jobs and not being able to find new employment in the area. Figure 20 also emphasizes the vulnerability of communities east of Frenchman Bay due to their lower availability of affordable housing. With these communities already at risk of losing their fishing jobs and potentially not being able to find other employment in the area, the added stress of finding affordable housing only further impairs the well-being of these communities.

Community Discussions

After the initial research on community dependency on commercial fishing and community vulnerability, the research team went to Maine to gain a local perspective on the potential impacts of the proposed aquaculture project on local fishing communities. The first community discussion workshop was in Bar Harbor and the second was in Winter Harbor. There were also phone interviews conducted with local fishermen and business owners to have more in-depth conversations about the potential impacts of the project.

Participants at both workshops and on phone calls shared many concerns with the potential for industrial-scale finfish aquaculture being implemented in Frenchman Bay. Those concerns

centered around four main topics: 1)

the size of the operation, 2) potential impacts on existing aquaculture and fishing operations, including deficiencies in the Maine's permitting system, 3) potential impacts from the infrastructure development needed to develop and operate the proposed aquafarm, and 4) the potential impacts on adjacent communities, and the future of Maine's cultural fishing heritage.

One of the main concerns with industrial-scale finfish aquaculture brought up by those interviewed was the scale and size of these projects (See Figure 21 and Figure 22).⁶⁹ The proposed American Aquafarms project would be one of the largest ocean-pen salmon farms in the world, and around 20 times larger than the company's home country of Norway would



**IT WAS LIKE A SMALL CITY THEY WERE
PROPOSING—IN THE MIDDLE OF PROBABLY
ONE OF THE MOST SEEN AND
PHOTOGRAPHED BAYS ON THE EASTERN
SEABOARD.**

Interview Respondent, Bar Harbor, ME

⁶⁹ American Aquafarms application for Net Pen Culture, Section 2, Site Development.

allow.⁷⁰ One interview respondent noted, “It was like a small city they were proposing in the middle of probably one of the most seen and photographed bays on the eastern seaboard.”⁷¹

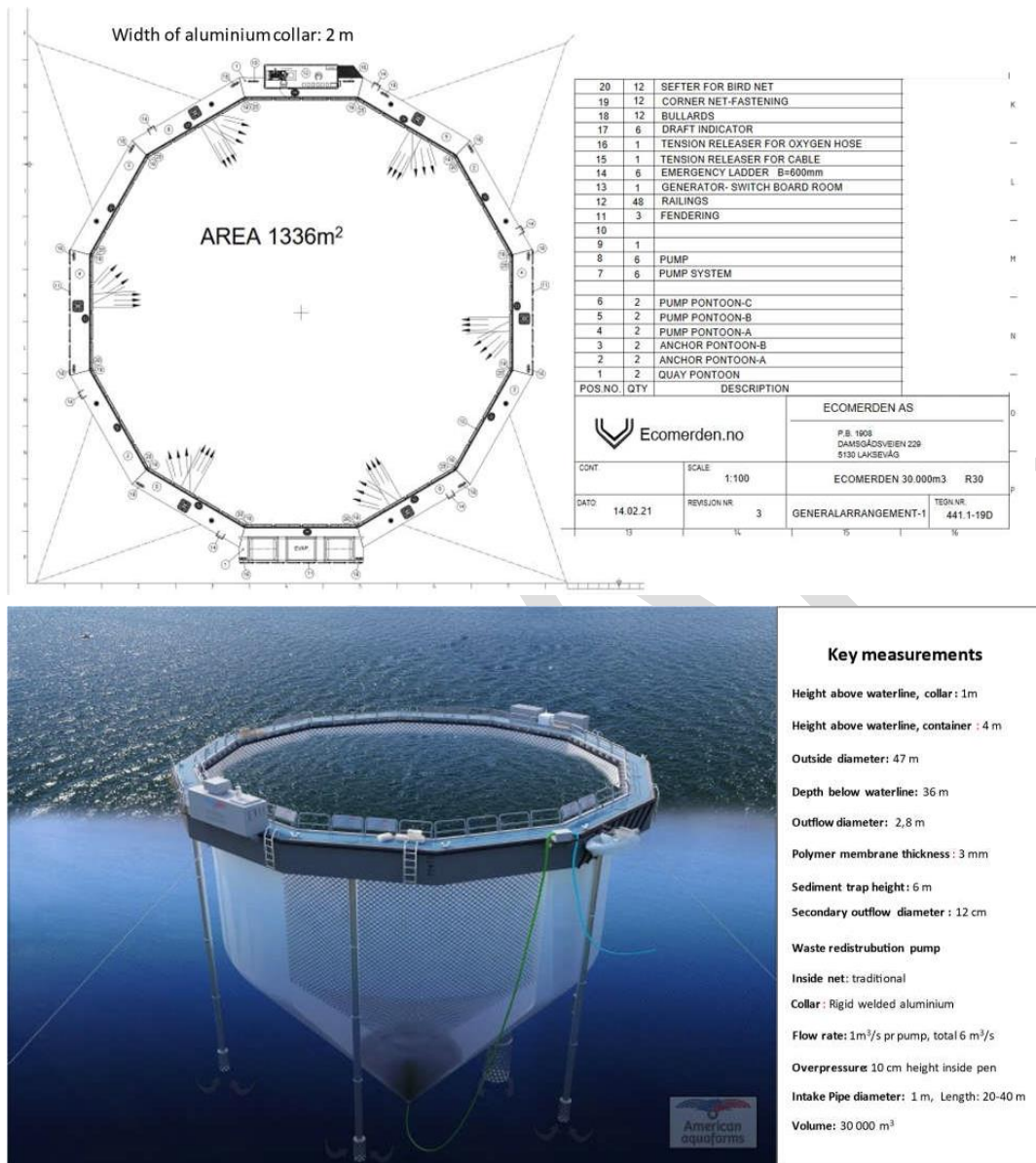


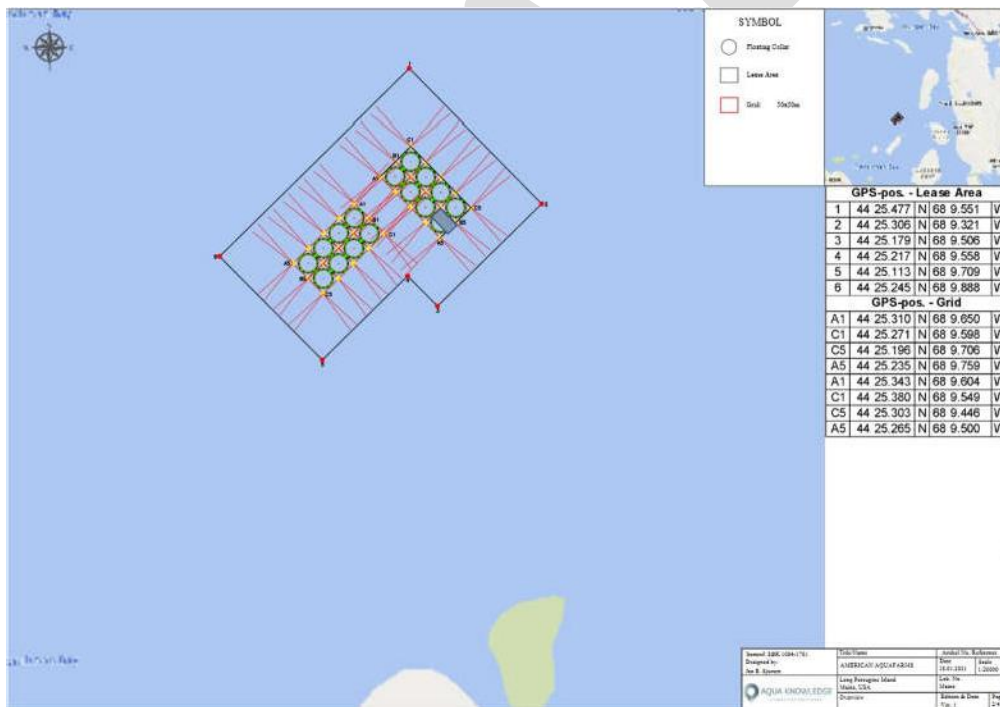
Figure 21. Single pen schematic

⁷⁰ Pers. Comm. Interview Respondent, South Gouldsboro, ME.

⁷¹ Pers. Comm. Interview Respondent, Bar Harbor, ME



FB01 Layout



FB 01



Figure 22. Pen system and mooring system schematic

Frenchman Bay has many small-scale aquaculture projects that have minimal impacts on the overall health of the bay and on surrounding communities (See Figure 16), but a large project like the one American Aquafarms was proposing would remove substantial areas of the ocean bottom for fishing, and has the potential to produce large amounts of pollution. Many of the current small-scale aquaculture leases in the area raise organisms like kelp and mussels that rely on the healthy nutrient balance that exists currently in Frenchman Bay. Large-scale finfish aquaculture requires massive amounts of feed which would alter nutrient distributions in the water.

Conversely, small-scale aquaculture can positively contribute to ecosystem health. Small-scale aquaculture can reduce pressures on wildlife stocks which helps alleviate overfishing and allow wild fish populations to maintain ecological balance. Small-scale aquaculture can also incorporate native species which can contribute to the conservation of local biodiversity and decrease the risks associated with invasive species.

One fisherman, who has a 35-acre lease in Frenchman Bay, discussed how Maine's Department of Marine Resources (DMR) doesn't have *enough* regulations when it comes to large-scale aquaculture; mentioning how it was easy to get a 500-acre or 1000-acre lease to finfish, "which is way too much for one company, let alone one individual".⁷² Another noted that relatively low prices per acre for permits may draw Norwegian aquaculture firms to Maine.⁷³ A focus group participant noted that "the particular location American Aquafarms proposed is the best lobstering ground location" indicating that many fishermen would be displaced from fishing grounds their families have been fishing on for centuries.⁷⁴ Large aquaculture leases take up bottom fishing space that is essential for the fishing communities surrounding Frenchman Bay.

Aside from impacts on fishermen, other residents in these fishing communities would also be negatively impacted. A large scale-aquaculture project would have impacts on local infrastructure like roads and water resources, which would place a burden on the small towns surrounding Frenchman Bay that may not have adequate budgets for the needed improvements in infrastructure.

Large-scale finfish aquaculture projects pose significant threats to ecosystems. One issue with a project of this size is the habitat destruction that occurs when building the project. Trucks and boats used during development of the project threaten ecosystems by releasing pollutants into

⁷² Pers. comm. Interview Respondent, Sorrento, ME.

⁷³ Pers comm. Interview Respondent, South Gouldsboro, ME.

⁷⁴ Pers. comm. Focus Group Respondent, Bar Harbor, ME.

the air and water. Aside from the pollution created while building a project of this size, project operations will also create pollution for years to come. Large-scale finfish aquaculture deposits large loads of nitrogen and phosphorous into waters, which can potentially cause algal blooms leading to the suffocation of organisms and massive die-offs in the area. One fisherman noted, that while Frenchman Bay was not a closed system, the hydrology of the bay indicates it does not flush well. He remarked that if thousands of fish release waste into the bay, “it will completely change the ecosystem, it will devastate it. It won’t just affect the lobsters, but it will affect every species in the bay. It could be eelgrass, kelp, seaweed, it will change and devastate everything.”

One focus group respondent mentioned that no one wants “a finfish Fukushima.” If something goes wrong in a project like this, the company can just shut down operations and leave while the local communities will be stuck with the devastation for generations to come.

One focus group respondent noted that the daily vessel traffic from the proposed project is expected to burn approximately one million gallons of diesel fuel a year, more than all the boats currently in Frenchman Bay combined.⁷⁵ Participants also discussed how daily operations create the potential for an accident that would be devastating to the fisheries in Frenchman Bay. If a pipe bursts, thousands of gallons of sewage could be released into the pristine waters of Frenchman Bay. If a net tears, thousands of fish could be released into the open water completely altering the natural dynamics of the ecosystem. One focus group respondent mentioned that no one wants “a finfish Fukushima.” If something goes wrong in a project like this, the company can just shut down operations and leave while the local communities will be stuck with the devastation for generations to come.

The fishing industry is extremely sensitive to change and relies on a balance between environmental conservation, economic viability, and social welfare. Communities in Maine, especially those on the coast, rely heavily on the fishing industry to support their livelihoods, their families, and their culture. Overfishing, pollution, and environmental degradation all have the potential to deplete fishing populations and disrupt marine food chains that cause ecological imbalances. Ecological imbalances threaten the stability of fisheries which also threatens fishing communities for generations to come.

⁷⁵ Pers. Comm. Focus Group Respondent, Winter Harbor, ME.

For generations, fishermen have been working collaboratively to sustain the fishery that shapes communities surrounding Frenchman Bay. One fisherman mentioned how their ancestors studied the lobster fishery and came up with measures to help sustain the fishery for years to come which has made the fishery as successful as it is today. Lobstermen monitor their catch to make sure they aren't taking any lobsters that are too small, lobsters that are carrying eggs, or any bycatch that they do not need.⁷⁶ Another respondent on the phone said, "We have all kinds of measures in our fishery, so we have a great fishery for years to come. If a large-scale aquaculture project comes along in our bay or anywhere in Maine, it's bad news for generations to come. It will wipe out our heritage of fisheries because there won't be anything left to fish in these areas."⁷⁷

If a large-scale finfish aquaculture project were to be built in Frenchman Bay and devastate the ecosystem, the economic impacts would be felt across the entire state. One fisherman talked about how some people may think a project like this will only hurt places like Sorrento or Bar Harbor, but there will be impacts to businesses across the state, even those far away from the coast,⁷⁸ noting how the economic impacts of the local lobster and tourism and recreation industries spread across the state. One focus group respondent mentioned similarly, how disease from these large aquafarms would get trapped into the bay and move up into the rivers, which would also increase the negative economic impacts felt throughout the entire state.⁷⁹

Increased pollution and loss of fishing grounds in waters will put fishermen out of business, causing them to look for other jobs that pay enough to make a living, which is limited in many of these fishing communities (See Figure 17 and Figure 19). While American Aquafarms claims that their projects will create jobs and help the local economy, many locals are doubtful that the jobs created will be desirable. They are likely to be low paying and won't provide as much revenue as a fishing job would. Several focus group and interview respondents spoke about a severe lack of low-skilled workers in the area, noting help wanted signs that are prevalent in local businesses, and sharing personal stories of the difficulties of finding and maintaining entry-level staff. Others noted that seafood processors in South Gouldsboro currently import seasonal workers to fill positions. The areas surrounding Frenchman Bay have lower unemployment numbers than the national average, indicating that there isn't a readily available workforce in the area.⁸⁰ One focus group respondent described the jobs provided by

⁷⁶ Pers. comm. Interview Respondent, Sorrento, ME.

⁷⁷ Ibid.

⁷⁸ Ibid.

⁷⁹ Pers. comm. Focus Group Respondent, Bar Harbor, ME.

⁸⁰ NOAA, "Total Coastal Economy."

companies like American Aquafarms to be “nasty jobs that are hard to find people to work them.”⁸¹ While the American Aquafarms project does indicate that it will provide some higher-skill and higher-salary jobs, respondents from one focus group mentioned that these higher paying jobs like operational positions can potentially be worked remotely which also won’t help the local economy.⁸² One problem that comes with importing workers is an increased demand for housing, and a strain on local infrastructure. Respondents in one focus group discussed how there is already a housing crisis in the area due to the shortage of affordable housing. Importing workers from other countries will only worsen the housing crisis, therefore forcing locals out of the area in search of more affordable housing. In addition, the salaries paid to these workers are also unlikely to remain in the local economy—as foreign workers often send much of their pay home to support their families—reducing any local economic benefits of the project.

The loss of fishing jobs in the Frenchman Bay area will not only have impacts on the economy but is likely to impact Maine’s fishing heritage. Maine’s fishing heritage has played an integral part of the state’s identity for centuries. Maine’s coastal towns and villages were developed around fishing activities, giving these communities strong maritime identity that has been celebrated for centuries. One focus group respondent stated that it is “a travesty that the state doesn’t protect heritage fishing.”⁸³

Most respondents had relatives in the fishing industry, and fishing traditions in Maine have been passed down for generations to ensure a sustainable and long-lasting fishery. Many of the fishermen also have children and grandchildren in the fishing industry, however, many are becoming more hesitant about the future success of the industry. One fisherman mentioned how he advised his son to go to college and get a degree instead of staying in the fishing industry. As much as he would have loved to be working with his son on the waters, he told him that “the future in our fisheries doesn’t look that good because of the pressures we get from all the outsiders.” His son got his lobster license when he was young, but ultimately decided to move inland and start a more stable career.⁸⁴ Even as a fourth generational fisher, he did not see a future in the industry, as do many others in the younger generation who foresee the changes threatening the industry.

⁸¹ Pers. comm. Focus Group Respondent, Bar Harbor, ME.

⁸² Ibid.

⁸³ Pers. Comm. Focus Group Respondent, Winter Harbor, ME.

⁸⁴ Pers. comm. Interview Respondent, Sorrento, ME.

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VI. Summary/Discussion

Distilled to its simplest form, Frenchman Bay currently supports a vibrant local economy. The large-scale aquaculture project proposed by American Aquafarms would put that economy at risk.

In 2022, nearly 4 million visitors to Acadia National Park added \$479 million to the local economy in the form of visitor spending, supporting nearly 7,000 jobs and contributing \$691 million to the national economy.⁸⁵ Non-local visitors account for about 98 percent of this spending.⁸⁶ In short, people from other parts of the country and from around the world visit Acadia National Park, bringing significant revenues to hotels, restaurants, campgrounds, kayak rentals and other recreational vendors, retail shops, grocery stores, and other local businesses. The visual impacts of thirty pens capable of producing 66 million pounds of salmon each year would spoil the natural vistas that attract visitors to the Maine coast. The cost to these local businesses must be considered as an offset to the anticipated benefits of this, or any future, large-scale aquaculture development.

While the number of self-employed fishermen has been steadily declining in Maine, *Hancock County, surrounding Frenchman Bay, supports more fishing jobs than any other Maine county.* Statewide in 2019, self-employed workers accounted for 61 percent of commercial fishing jobs state-wide. Hancock County had an even higher proportion of self-employed workers, accounting for 70 percent of fishing jobs. The importance of Maine's seafood industry is more obvious when viewed in terms of its economic impact. In 2019, this industry had an economic impact of \$1.1 billion, excluding the activity associated with seafood imports. American lobster dominated the seafood landings, comprising 75 percent of the total, while other shellfish accounted for 23 percent, and finfish made up only 2 percent of the overall landings. Over the past decade, seafood harvests experienced substantial growth, rising by nearly 50 percent, and reaching a peak of over \$700 million in 2016. Although there was a slight decline in the subsequent years, the industry remained robust, with landings of \$657 million in 2019⁸⁷.

Hancock County is heavily reliant on marine resources, making it particularly vulnerable to environmental impacts. Marine businesses are especially vulnerable due to limited relocation

⁸⁵ <https://www.nps.gov/acad/learn/news/20230830.htm>

⁸⁶ National Park Service, "2021 National Park Visitor Spending Effects."

⁸⁷ National Marine Fisheries Service, "Fisheries Economics of the United States."

options. The marine economy in Hancock County includes 561 businesses and 6,230 total jobs, making up 20.3% of the total employment in the county.⁸⁸

In 2020, Hancock County's total wages from living resources was \$24.6 million.⁸⁹ Living resources include commercial fishing, fish hatcheries, aquaculture, seafood processing, and seafood markets.⁹⁰

Maine's aquaculture industry is growing steadily and benefiting from innovation and research. Oysters and mussels were among the primary species being cultivated due to their popularity and ecological benefits. The state is also exploring the cultivation of kelp and sea vegetables, driven by rising demand for sustainable seafood and the state's favorable coastal conditions. Small marine aquaculture operations have some advantages over large farms. They tend to have lower environmental impacts since they often use less space and resources. Small-scale operations can also have a more localized focus, which can directly benefit local jobs, revenues, and communities. On the other hand, large marine aquaculture farms may have economies of scale, enabling them to produce more efficiently and at lower costs. However, they can also pose greater environmental risks due to their larger scale, potentially leading to more significant pollution and habitat disturbances.

Overall, Maine's ocean economy is resilient, with a 26 percent employment growth between 2005 and 2019, surpassing the growth of Maine's total state economy (5 percent). During the global economic crisis starting in 2008, employment in the ocean economy declined by only 2 percent, half the decline observed in Maine's state economy (See Figure 10).⁹¹

At the same time, however, Maine's fishing heritage is at risk. The fishing industry is extremely sensitive to change and relies on a balance between environmental conservation, economic viability, and social welfare. Communities in Maine, especially those on the coast, rely heavily on the fishing industry to support their livelihoods, their families, and their culture. Overfishing, pollution, and environmental degradation all have the potential to deplete fishing populations and disrupt marine food chains that cause ecological imbalances. Ecological imbalances threaten the stability of fisheries which, in turn, threatens fishing communities for generations to come. For generations, fishermen have been working collaboratively to sustain the fishery that shapes communities surrounding Frenchman Bay.

⁸⁸ NOAA, "ENOW Explorer Wages."

⁸⁹ NOAA, "Total Coastal Economy."

⁹⁰ Ibid

⁹¹ Ibid

ECONOMIC IMPACT ANALYSIS AND ROSE-COLORED GLASSES

Economic impact analysis is a valuable tool used to assess the overall effects of an economic change, such as the establishment or closure of a new business or the implementation of a new policy. Such changes trigger direct effects that reverberate through the economy, magnifying the impact like the ripples emanating from a stone thrown in the water.

However, like any useful tool, economic impact analysis can be misused, leading to exaggerated or false results. The accuracy and reliability of the analysis depend on the quality of the inputs used in the model, the assumptions made, and a realistic interpretation of the calculated results. *The following paragraphs highlight several potential flaws that can arise when assessing the economic impacts of the American Aquafarms project.*⁹²

There are many ways in which the economic impacts of the American Aquafarms project can be exaggerated. As mentioned in earlier sections of this report, one such way is by neglecting to account for the potential costs that would be imposed on Maine's residents and businesses. However, there are other potential exaggerations that can be embedded in an economic impact study.

While high-paying jobs may seem enticing, caution should be exercised when considering claims of wages higher than the current prevailing rates. If the new jobs require similar skills to those already present in the economy, it is reasonable to expect that the new workers will be paid comparable wages. Jobs paying above the prevailing rate may demand higher or specialized skills that might not be readily available in Maine. It is possible that the highest paying jobs in a large-scale aquaculture operation using Norwegian technology may necessitate importing Norwegian workers.

Another area of potential exaggeration is job creation. With Maine's current unemployment rate below 3 percent, businesses already face challenges in recruiting and retaining workers. This may lead to the recruitment of workers from outside of Maine, raising questions about the desirability of an economic enterprise where the benefits go to newcomers while the costs, as discussed above, are borne by Maine residents and businesses. Additionally, this influx of new workers may result in population increase, further impacting the region.

⁹² In April 2022, Maine DMR denied the company's application for two leases in the bay, citing a lack of an approved egg source for its salmon. However, this reports findings remain unchanged, and are important considerations for future large-scale aquaculture permit applications in Frenchman Bay or in other bays along the coast of Maine.

Economic impact analysis reflects the economic relationships that already exist. However, Maine's current supply chains may not support the acquisition and operation of Norwegian technology, meaning that many of the economic effects could occur outside of Maine, possibly benefiting Norway and other locations instead.

These are just a few of the considerations that warrant investigation when estimating the economic benefits of constructing and operating a massive aquaculture operation in close proximity to Acadia National Park and within Maine's critical commercial fishing region.

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VIII. Appendix. Community Discussion Questions

Listed below are the questions that guided each of the focus groups conducted during this research project. The project team developed two sets of questions, one aimed primarily at fishermen, and the other aimed primarily at owners of tourism- and recreation-related businesses. There is one question that was aimed at both groups (see below). Because our focus groups were mixed, and included both commercial fishermen as well as owners of tourism and recreation-related businesses, all questions were asked to the members of the focus groups. In individual interviews, only the pertinent set of questions was discussed.

Questions for commercial fishermen:

- 1) We recognize that there are many types of fishermen with various fishing styles and fishing locations in the Frenchman Bay area. How might a large-scale finfish aquaculture project affect how, where, and what you are able to fish?
- 2) It is apparent that fishermen must collaborate with each other to keep the fishery healthy. How might a large-scale finfish aquaculture project change how local fishermen interact with each other?
- 3) With many multi generation families living and working in fishing communities along the coast of Maine, how might a large-scale finfish aquaculture project affect your family?
How has your family been fishing?
Do you think your children will work in the fishing industry?
- 4) Considering the amount of jobs that might be created by a large-scale aquaculture operation, do you think people would take aquaculture jobs in this area or do you think that the workers would come from other parts of Maine? Are there a lot of folks looking for work?
- 5) We are curious how many people live in the same town they fish in and how many people have a long commute to work. How long does it currently take you to commute to your job? Do you think this might be impacted by a large-scale aquaculture project?
- 6) We have found limited data on the number of commercial fishing vessels in smaller communities surrounding Frenchman Bay. Do you know many commercial fishing boats are in your fishing community? What town do you fish out of?
- 7) What other concerns do you have that we haven't mentioned?

Question for both:

- 8) We do have one question that applies to both the fishing community and recreation and tourism community - We found that Frenchman Bay supports a larger

number of fishermen and recreation and tourism related jobs than neighboring towns. Does this seem accurate?

Questions for tourism- and recreation-related businesses:

- 9) We recognize that there are lots of different types of recreation and tourism related businesses surrounding the Frenchman Bay area such as kayak outfitters, bay cruises, gift shops, restaurants, etc. What types of recreation and tourism businesses do you think would be most affected by a large-scale finfish aquaculture project?
- 10) Thinking about this community and how it must grow during the summer season - we are assuming that many of your summer workers come from elsewhere. Is this correct, and where do they generally come from?
- 11) We have heard that the tourism industry is on the rise in the Schoodic Peninsula area. How do you think a large-scale finfish aquaculture project would affect this?
- 12) We have found that many tour group companies in and around Acadia National Park have emphasized the silence during tours that allows you to experience sounds of the natural world. How do you think an increase in noise pollution from an aquaculture project would affect a visitor's perception of the Frenchman Bay area?
- 13) According to our research, large portions of Frenchman Bay currently have the highest water quality rating possible in the State of Maine. A large-scale aquaculture project could potentially release more nitrogen into the water than Maine's four largest cities combined. How do you think an increase in water pollution would affect the recreational fishing and kayaking business?