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AQUACULTURE  
ASSOCIATION**

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*Aquaculture  
in Maine*

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## Key Findings:

- **More than 25 diverse species of finfish, shellfish, and sea vegetables are farmed in Maine**
- **Maine aquaculture represents \$85-\$110 million a year in sales**
- **Maine aquaculture provides jobs for more than 700 year-round employees across 200 farms (source: 2017 Maine Aquaculture Economic Impact Report)**
- **More than 99% of Maine sea farms are family-owned**
- **One in six Maine sea farmers also holds a commercial lobstering license.**
- **Maine aquaculture has enjoyed responsible growth over the last 20 years at an average rate of 2%. Globally, aquaculture is growing at 8% per year (FAO).**
- **Less than 1% of Maine's coastal waters are used for aquaculture.**
- **Pound per pound, Maine aquaculture produces among the lowest carbon footprints of any animal protein.**

Source: Maine Aquaculture Association

## Introduction to Aquaculture

Maine, a state known for its iconic rugged coastline and rich marine resources, is home to a diverse range of native aquatic species. From the cold, pristine waters of the Gulf of Maine to the inland rivers and lakes, the state offers a unique environment for the cultivation of various marine and freshwater species.

This booklet will explore the importance of aquaculture in Maine, the commonly farmed species, the benefits and challenges of the industry, sustainable practices, education and training opportunities, and the future prospects of Maine's aquaculture industry.



## Importance of Aquaculture in Maine

Aquaculture plays a vital role in Maine's economy and food system. With its abundant coastline and inland water bodies, the state has immense potential for both marine and freshwater aquaculture development.

The aquaculture community in Maine is not only working to meet the increasing demand for local seafood, but also to create year-round employment opportunities and contribute positively to the state's economy. Furthermore, aquaculture reduces the pressure on wild populations, allowing them to replenish and thrive.

## Aquaculture Jobs in Maine

Recent growth of the aquaculture sector in Maine has led to the creation of numerous job opportunities. From farmers and technicians to researchers and educators, there is a diverse range of roles available in this sector. Aquaculture careers in Maine include hatchery and farm work, marketing and sales, seafood processing, gear manufacturing, distribution and retail, hospitality and tourism, education, engineering, and research and development. These careers offer a chance to work in a dynamic and evolving industry, contributing to the sustainable production of local healthy seafood.



## Challenges Faced by Maine's Aquaculture Sector

While the aquaculture sector in Maine offers substantial benefits, it also faces certain challenges. Regulation of water quality, waste management, and disease prevention are crucial to ensure the long-term viability of the sector. Additionally, it is important that any potential conflicts with other marine users, such as commercial fishermen and recreational boaters are minimized or avoided. To address these challenges, Maine has implemented a robust regulatory framework to govern aquaculture operations and protect the state's natural resources.

## Commonly Farmed Finfish Species in Maine

Maine's diverse marine and freshwater habitats provide the perfect conditions for farming a variety of finfish species. Some of the commonly farmed finfish species in Maine include Atlantic salmon, rainbow trout, American eel, yellowtail kingfish, tilapia, and several species of baitfish. These species are not only highly sought after for their culinary qualities but also have a strong market demand both domestically and internationally. The cultivation of these finfish species in Maine ensures a consistent supply of fresh, locally sourced seafood.

## The Benefits of Consuming Farmed Seafood

Regardless of whether they are farmed or wild, fish and shellfish offer some of the lowest carbon footprints of any animal-based protein in the world.

Requiring far less feed, land, fresh water, and energy to produce than animals farmed on land, seafood is a climate-smart choice that consumers should feel good about supporting. In addition, seafood is extremely high in important nutrients including protein, omega-3 fatty acids, vitamins, and micronutrients that can be hard to find in plant-based diets. Responsibly farmed seafood is no less nutritious than its wild-caught counterparts, and both wild and farmed seafood are essential to help meet the nutritional demands of a growing world population.



Farm-raised fin fish are raised in controlled conditions and fed nutritionally appropriate diets. These fish are raised in contained systems that allow them to be monitored closely, ensuring that the fish are happy, healthy, and safe to eat. Modern fish farms are nothing like those of the past, as aquatic health and fish welfare science has advanced dramatically over the past 30 years. For example, before leaving land-based hatchery facilities and moving out to ocean net pens, fish can be vaccinated which helps protect them from diseases that are already present in the wild. Combined with the traditional practice of selectively breeding disease-resistant fish, vaccination has greatly reduced the need to treat fish with chemical therapeutants and antibiotics.

## Benefits of Aquaculture for Maine

Aquaculture in Maine offers numerous benefits, both for the environment and the economy. First, it reduces the pressure on wild fish populations, helping to maintain their numbers and preserve biodiversity. Second, it promotes food security by providing a reliable source of high-quality, sustainable seafood. Additionally, aquaculture contributes to the local economy by creating jobs and supporting related industries such as hospitality and tourism, marine businesses and working waterfronts, manufacturing, research, and seafood distribution. Furthermore, aquaculture in Maine adheres to strict environmental regulations, ensuring responsible and sustainable practices.



### Sustainable Practices in Maine's Aquaculture Sector

Sustainability is a key focus of Maine's aquaculture sector. Farmers in the state employ a range of practices to minimize the environmental impact of their operations. These include careful site selection, monitoring and controlling water quality, using sustainable feed sources, minimizing waste production, and implementing responsible fish health management practices. The state also encourages research and innovation to develop new technologies and techniques that further enhance the sustainability of the sector. By prioritizing sustainability, Maine's aquaculture sector ensures the long-term health of both the environment and the businesses involved.



### Aquaculture Education and Training Opportunities in Maine

Maine recognizes the importance of education and training in developing a skilled workforce for the aquaculture sector. The state offers various programs and resources to support individuals interested in pursuing careers in aquaculture. These include apprenticeships, university programs, vocational training, internships, and workshops. Students can learn about fish biology, aquaculture techniques, business management, and environmental stewardship. By investing in education and training, Maine aims to nurture a talented pool of individuals who can contribute to the growth and success of the aquaculture sector.





## Future Prospects and Growth of Maine's Aquaculture Sector

The future of Maine's aquaculture sector looks promising. With increasing consumer demand for sustainable and locally sourced seafood, the state is well-positioned to meet these needs. Advances in technology and research continue to drive innovation in the sector, leading to improved efficiency and environmental sustainability.



### The Potential of Salmon in Maine Aquaculture

Salmon has tremendous potential in Maine aquaculture due to its high market demand and nutritional value. Farmed salmon in Maine can provide a sustainable alternative to wild-caught salmon, reducing pressure on wild fish populations. Additionally, salmon farming in Maine creates jobs and stimulates economic growth in rural coastal communities. The state's cold, clean waters are ideal for raising native Atlantic salmon, ensuring their quality and taste. By adopting responsible farming practices, such as proper feed management and disease prevention, Maine has set a high standard for salmon farming around the world, and is seen as a leader in the sector. One of the most innovative practices pioneered by salmon farmers in Maine that has been adopted in other places is site rotation and fallowing. While there are just over 600 acres of Maine ocean waters leased to salmon farms, only about two thirds of those acres are in production in any given year. Having a larger acreage than is needed at one time allows salmon farmers to rotate production between sites, which promotes good water quality by preventing nutrient overload. As a testament to our best management practices, farmed salmon from Maine is one of the only two sources of Atlantic salmon in the world to receive a "good alternative" rating from the Monterey Bay Seafood Watch program.

Furthermore, collaborations between government agencies, industry stakeholders, and research institutions are fostering an environment of cooperation and growth. As Maine's aquaculture sector expands, it will continue to provide economic opportunities, contribute to food security, and promote sustainable practices.

Aquaculture, the farming of aquatic organisms, has become an increasingly important industry in Maine. With its vast coastline and abundance of water resources, the state is well-positioned to capitalize on the potential of aquaculture.

Maine's aquaculture sector is not only economically important, but it also provides sustainable food sources and helps to protect and restore marine ecosystems. Below, we will explore the benefits of several key species in Maine aquaculture, including salmon, oysters, mussels, kelp, and scallops.

We will also delve into the rise of Recirculating Aquaculture Systems (RAS) and highlight success stories in Maine aquaculture.

### The Importance of Sustainable Aquaculture Practices

Sustainable aquaculture practices are crucial for the long-term success of the sector. By implementing responsible farming techniques, such as minimizing environmental impact, using efficient feed, and monitoring water quality, Maine aquaculture can minimize its ecological footprint. Sustainable aquaculture also ensures the well-being of the farmed organisms, as well as the health and safety of consumers. Additionally, sustainable practices allow for the preservation and restoration of natural habitats, which benefits both the environment and the aquaculture sector in the long run.

## Exploring the Benefits of Oysters in Aquaculture

Oysters are another valuable species in Maine aquaculture. These filter-feeding bivalves help to improve water quality by removing excess nutrients and promoting biodiversity. Oyster farming also creates important habitat structures, providing a home for other marine organisms. Further, oysters require no feed inputs and get all of the nutrition they need from phytoplankton and algae naturally occurring in the water. By filter-feeding, oysters increase water clarity and sunlight penetration, which in turn helps other marine species thrive, like seaweeds and other organisms. In addition to their environmental benefits, oysters are highly nutritious, rich in vitamins, minerals, and omega-3 fatty acids. Maine's cold waters and nutrient-rich estuaries provide optimal conditions for oyster growth, making the state an ideal location for oyster aquaculture. By embracing oyster farming, Maine can enhance its coastal ecosystems while reaping the economic and nutritional benefits.



## Scallops: a Valuable Resource in Maine Aquaculture

Scallop farming is still in the early stages of development in Maine, although there are a handful of pioneers who have been working to develop this practice since the 1990s. Scallops are highly valued in the culinary world and have significant economic potential in Maine aquaculture. They are not only delicious but also offer environmental benefits. Scallops are filter feeders, similar to oysters and mussels, and help to maintain water clarity. Maine's cold waters provide an ideal environment for scallop farming, ensuring their growth and quality. Maine has a robust wild scallop fishery, however the harvest season for scallops is relatively short and occurs in the winter when Maine's hospitality industry is at its lowest point. By cultivating scallops, Maine can support local fishermen by creating new economic opportunities while also producing a delicious, healthy, and sustainable source of Maine scallops year-round to complement the wild product



## The Advantages of Mussels in Maine Aquaculture

Mussels are another species that offer numerous advantages in Maine aquaculture. Like oysters, mussels are filter feeders, removing excess nutrients from the water and improving water quality. Mussels grow rapidly and have a high market value, making them an attractive choice for farmers. Additionally, mussel farming can provide important ecosystem services, such as enhancing biodiversity and providing habitat for other marine species. Mussel farming has become popular in Maine in recent years as declines in wild harvest have made accessibility to this important species difficult. By growing mussels, Maine farmers are taking pressure off wild mussel beds and helping to meet demand for this important protein source all over the US. By harnessing the potential of mussel aquaculture, Maine can further strengthen its sustainable seafood industry.





### The Rise of Recirculating Aquaculture Systems (RAS) in Maine

Recirculating Aquaculture Systems (RAS) technology has been expanding in Maine's aquaculture sector. RAS allows for the farming of fish and other aquatic organisms in a controlled environment in land-based systems. Fish farms in Maine have been employing land-based RAS technology in hatcheries for decades, but recently there has been a surge of interest in developing RAS grow-out facilities that raise fin fish from egg to harvest size on land. RAS technology involves the filtering, recirculating, and treating of the water to ensure optimal conditions for the farmed species. There are pros and cons to farming on land and on sea. Benefits of RAS include greater control over the aquatic ecosystem and close proximity to markets. Drawbacks include greater energy use and higher costs of production when compared to traditional net pen systems. Both RAS and traditional net pens play a vital role in Maine aquaculture, and we need both to thrive in order to have a diverse, resilient sector. Maine currently has two fully permitted and active RAS operations, one of which has undergone full construction and is producing fish. That facility is owned by American Unagi, the nation's first commercial-scale American eel farm located in Waldoboro. American Unagi works directly with Maine fishermen who harvest juvenile wild glass eels (AKA "elvers") from Maine's rivers.

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### The Role of Kelp in Sustainable Aquaculture

Kelp, a type of seaweed, is gaining recognition as a valuable resource in Maine aquaculture. Kelp farming has a net positive impact on aquatic ecosystems by removing excess carbon and nitrogen from the water, providing habitat to other species, and helping several native species of shellfish thrive by reducing ocean acidification. Kelp also has versatile applications, such as food, nutraceuticals, skincare, fertilizer, biofuels, and can even be used to make plastic alternatives, making it a promising opportunity.

Maine's cold, nutrient-rich waters are ideal for kelp cultivation, and the state has seen a significant increase in kelp farms in recent years. Home to the nation's first commercial-scale kelp farm, Maine is a leader in US line-grown kelp farming, which is being pioneered by Maine lobstermen. Kelp farming is a fantastic complement to the lobster industry because the kelp season is countercyclical to the lobster season, making it an attractive diversification strategy employed by Maine fishermen. In 2023, Maine kelp farmers produced over 50 percent of the nation's farmed kelp. By embracing kelp aquaculture, Maine can mitigate the impacts of climate change, promote sustainable business practices, and diversify its seafood offerings.



### The Rise of Recirculating Aquaculture Systems (RAS) in Maine, continued

The company purchases the elvers from the harvesters and raises them to maturity before they are harvested and sold to high end sushi restaurants all around the US. The second RAS company to be fully permitted in Maine is Kingfish Maine, a Dutch company with plans to grow yellowtail kingfish at a RAS facility in Jonesport. Kingfish received all of their necessary permits from the local, state, and federal governments in 2022 and plans to begin construction on the Jonesport site in the near future.



### Conclusion: The Future of Aquaculture in Maine

As the demand for sustainable seafood continues to rise, the future of aquaculture in Maine looks promising. By harnessing the potential of salmon, oysters, mussels, kelp, scallops, and innovative technologies like RAS, Maine can strengthen its position as a leader in sustainable US aquaculture. With careful management and responsible practices, Maine's aquaculture industry can thrive economically while preserving and restoring marine ecosystems and economies. By supporting and promoting the benefits of aquaculture, Maine can unlock its full potential and contribute to a more sustainable and resilient food system.



### Success Stories in Maine Aquaculture

Maine's aquaculture sector has witnessed several success stories in recent years. For example, salmon aquaculture has attracted investment and created good paying jobs in rural coastal and inland communities. Maine salmon farms are setting a global standard for sustainably produced salmon that provides a good source of healthy protein to American consumers. Oyster aquaculture has also been thriving, with a growing demand for Maine oysters in Maine and in the US. Additionally, kelp farming has seen a remarkable expansion, driven by Maine fishermen who've sought economic diversification strategies in the face of climate change. These success stories demonstrate the immense potential of Maine aquaculture and highlight the importance of sustainable practices in achieving long-term success.



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To learn more about the exciting developments in Maine's aquaculture sector, visit [Maine Aquaculture Association's website](https://www.maineaquaculture.org) and stay updated with the latest news and initiatives.