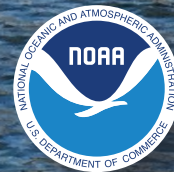


What's in the Water?

Oyster Farming

For thousands of years, harvesting of wild oysters has taken place at various points along the Maine coast, as indicated by the remnants of ancient shell piles (called middens) left by indigenous communities. The current increase in oyster farming has a more recent history, dating to the 1970s when UMaine researcher Dr. Herb Hidu brought hatchery technology to the Darling Marine Center and began a program of research that eventually supported some of Maine's first oyster farmers. In 2023, roughly 150 farms collectively produced about 14.2 million oysters, with a total economic value of over \$10 million.



The Maine Sea Grant College Program at the University of Maine, sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the State of Maine, is a part of a network of 34 NOAA Sea Grant Programs throughout the coastal and Great Lakes states and territories.

While some farmers grow oysters directly on the seafloor, many oyster farms use gear that floats on the surface. This allows the farmer easy access for grading and harvesting activities, and warmer surface waters provide good growing conditions for oysters.

Surface Culture

What Can I See?

Oyster Cages

Oyster farmers often use wire mesh cages mounted on two parallel, pontoon-shaped floats. What you see depends on the position of the cage. In the drying position, the individual cages - with the oysters inside them - are completely out of the water and the floats support the cage. In the feeding position, the cage and the oysters are in the water, and you'll see the floats lined up in pairs in a long row.



Oyster cages in the feeding position



Oyster bags attached to floats

Oyster Bags

Some farmers use individual floating bags to hold the oysters. These black plastic bags are approximately 30" long by 24" wide, with two floats attached. These oyster bags will sit half-submerged at the surface so that the oysters are in the water, but the top half of the bag is exposed to air. Often, these bags are arranged in long strings, usually parallel to the current.



Oyster cage hanging from a longline

Longline Systems

A few farms use longlines in the intertidal zone or in the shallow subtidal zone; these setups use a series of posts or metal 'staples' to support oyster cages. As the tide drops, the oyster cages become visible.

What Can't I See?

Underwater, ropes connect the cages to one another and to anchors on the bottom of the ocean.

Bottom Culture

What Can I See?

For farms that use the bottom-seeding technique, there is no equipment - oysters are scattered directly over the seabed. However, Maine requires all aquaculture sites to be marked with corner buoys that read "SEA FARM".

What Can't I See?

Bottom culture farms mimic an oyster's natural habitat. As oysters grow, they form tightly packed beds on the seafloor.



Markers are required to be labeled with the lease acronym and have "SEA FARM" written in 2-inch high letters.

Farming Process

Hatchery

Oyster larvae are raised in indoor, on-shore tanks during the winter months.



A floating screen of newly-settled oysters. They are so small at this size they resemble grains of sand.

Nursery

Small oysters are placed into seed bags that slide into floating shellfish gear. The oysters will grow to be about seven millimeters in this phase.

Upwellers are increasingly common along the coast. These can take many different forms, but all operate on the principle of directing a flow of seawater up through a bed of small oysters so that each oyster can feed well. Upwellers have several containers called silos. Several silos are usually set into a small raft, and these silos hold the small oysters. A pump is also attached to the raft to move the water up through the silos. An upweller will often be located in a protected area such as a marina, and they look just like a typical float - a casual observer might not know that it's actually a shellfish farm.



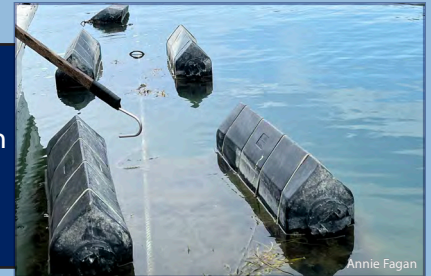
Upwellers are commonly used for the initial growing stage to protect the 2mm seed and to encourage growth by providing them with nutrient-rich water

Grow Out

Oysters will spend the next one to three years growing to market size in growout gear. This part of the cycle has several steps:

Feeding Position

Oysters cages are flipped down into the water, with the two long floats visible on the surface. This position allows oysters to access water full of the plankton they need to feed and grow.



Oyster cages in the feeding position

Drying Position

Every two weeks or so, a farmer will flip the cages so that they rest above the water on top of the two floats. Exposing the caged oysters to sun and air for a day or so eliminates anything that may try to grow on them, such as barnacles, mussels, and other biofouling species. Biofouling is the undesirable buildup of small plants, algae, animals, and other organisms on submerged structures.



Dana Morse

Oyster cages in the drying position

Thinning and Grading

As the oysters grow, they start to crowd each other. Periodically, farmers remove some oysters to keep the mesh bags from overfilling. Those oysters are run through a rotating tube with holes of various sizes, called a grader or a tumbler. As the oysters pass through, they are sorted into small, medium, large, and harvest size.



Dana Morse

Rotating grading machine

Harvest

After being graded, market-size oysters are brought to shore for sale.

Why Oyster Aquaculture?

Oyster aquaculture supports Maine's coastal communities by providing a source of seafood, jobs, and income. Farming oysters is a practice that requires little to no fresh water, and no fertilizer or food. Oyster aquaculture helps to protect against the risk of overfishing and depleting waters of the wild oyster population.



Joey Conroy



Maine Oyster Trail



Dana Morse



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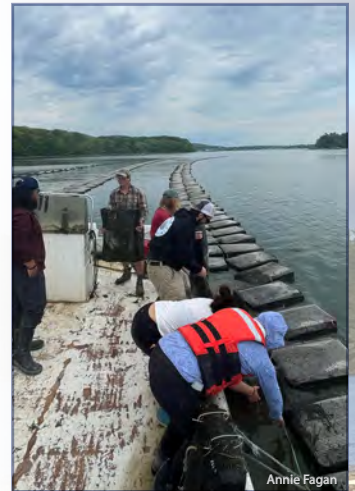
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Jaclyn Robinson



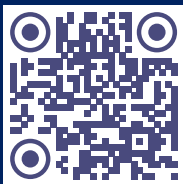
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Maine Sea Grant's work across Maine, from the Piscataqua River to Passamaquoddy Bay, is carried out on the lands and waters of the Penobscot, Passamaquoddy, Maliseet, and Mi'kmaq. We thank them for their stewardship and continued strength and resilience in protecting it. We support all efforts for healing and protecting the land and water we share.

Cover photo: Dana Morse, Design: Aimee Whitman

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What's in the Water?

Oyster Farming

FREQUENTLY ASKED QUESTIONS

What do oysters eat?

Oysters are filter feeders. They eat phytoplankton, a little bit of zooplankton, and detritus in the waters around them.

The American or Eastern Oyster, (*Crassostrea virginica*) is native to Maine, but ranges along the East Coast of North America from the Gulf of St. Lawrence to the Gulf of Mexico

Are oysters at risk for predation from other species on a farm?

Oysters grown right on the seafloor are at risk for predation by creatures like crabs, lobsters, and sea stars. Oysters grown in containers are usually quite well protected and usually do not suffer much loss from predation.

What happens in the winter when the water surface might freeze?

Many farmers "sink the farm" for the winter to protect the crop. This may mean transferring the oysters into cages that sit directly on the bottom, moving the strings of gear to a different location, or sinking the floating cages themselves. Floating/flippable oyster cage floats have caps on the end that can be removed - the floats fill with water and the whole cage can then sit on the bottom for the winter.

Who owns the farms?

All equipment, gear, and oysters on an oyster farm are privately owned by a farmer (an individual or a company). Farmers must hold a state-issued lease or license for the right to use Maine's coastal waters for aquaculture.

In 2023, Maine's commercial oyster landings valued over \$10 million for over 14 million oysters brought to market



How do oyster farms affect the environment?

An adult oyster can filter up to 50 gallons of water a day, pulling plankton, bacteria, or bits of organic material out of the water to eat. A farm with 100,000 oysters has the potential to filter up to five million gallons of water per day – meaning farms have the potential to improve the clarity and quality of surrounding waters.



Does the location of a farm affect the oysters?

Location has a profound effect on the farm. Wind, waves, current, storms - all of these factors and more are important considerations for growers, as they will affect the shape and look of the oysters. For example: windy, wavy waters can produce smoother and more polished oysters, kind of like rock tumblers.



How large are oyster farms?

Oyster farms can range from under an acre to more than 30 acres. In Maine, the average oyster farm is about seven acres.



How do storms affect oyster farms?

The biggest storm risk for oyster farmers is equipment failure: a rope breaking, an anchor releasing, or a shackle letting go. Farmers work hard to limit or eliminate the loss of gear, and to build and maintain robust farming equipment.



What precautions do boaters need to take around oyster farms?

Aquaculture farms are required by law to have marked buoys at the corners of each farm. It is the boater's responsibility to be aware of navigational hazards like ropes and cages inside of the farm site.