

What is Aquaculture?

Aquaculture is the farming of aquatic plants and animals. In Rhode Island, the focus has been shellfish and now seaweed (kelp) – Fish aquaculture is not permitted in the state. Regionally, shellfish, kelp, and salmon (Maine) are farm-raised products, whereas nationally the list also includes shrimp, tilapia and catfish.

Oyster Biology and Facts

Oysters are very efficient filter feeders with a range from Canada to the Gulf of Mexico. They can tolerate a wide temperature and salinity range and their life cycle ranges from free-swimming larvae to a sedentary (non-moving) adult.

Oyster History in Rhode Island

The commercial oyster industry dates back to the Civil War with a peak in oyster aquaculture in RI in 1911 with 21,000 acres under lease, generating (in today's dollars) over \$135M in revenue for state businesses. Eventually, a series of factors, including human and non-human induced, caused the demise of the oyster industry, culminating in the last oyster farm closing in 1952. The re-growth of the industry began with the Blount family in the mid-1970's, leading to a re-write of the state's laws around aquaculture in the 1980s and the first 'modern' oyster aquaculture lease being permitted in 1988 in Point Judith Pond.

Oysters in the Wild

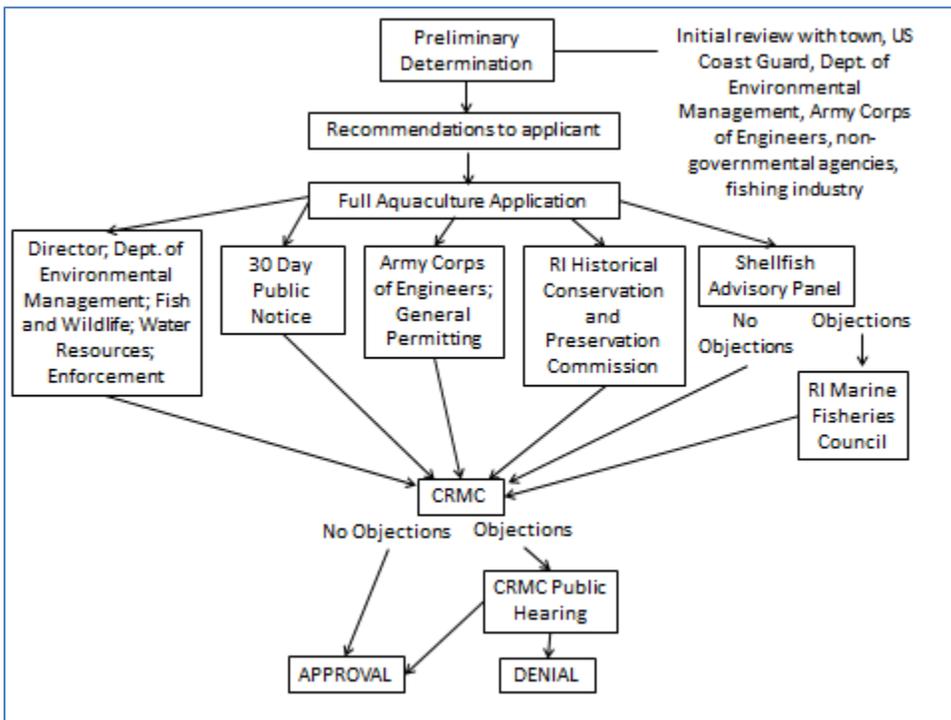
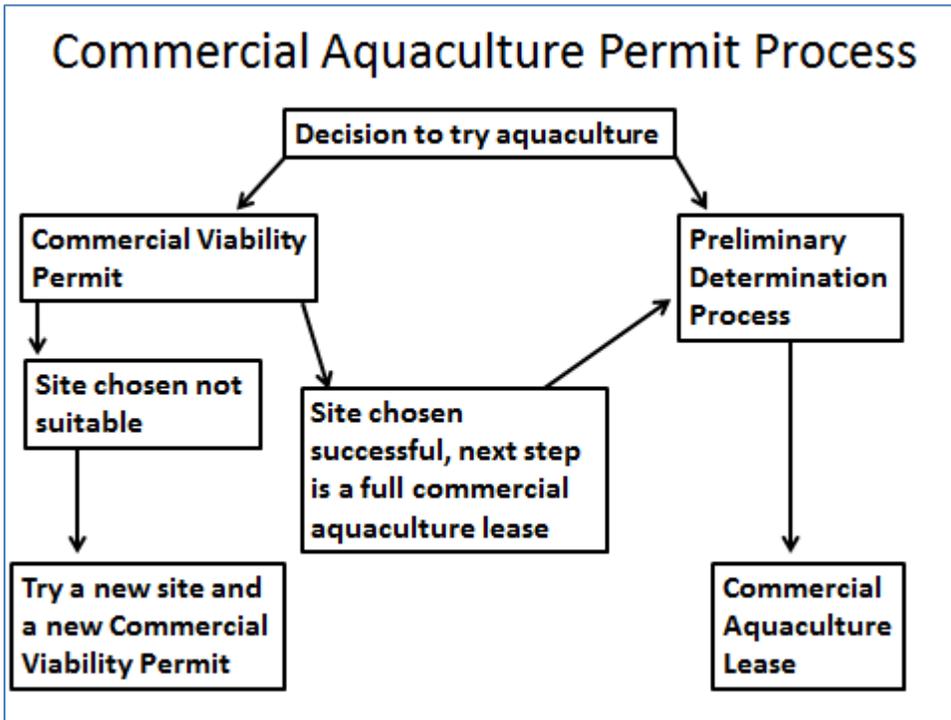
While there are wild oysters in the Bay and salt ponds in Rhode Island, their abundance is sporadic and dispersed. The state (RI DEM) allows for the harvesting of wild oysters between September 15 – May 15.

What did aquaculture look like last year (in 2015)?

The RI Coastal Resources Management Council produces a report each year summarizing the aquaculture industry in the state. To find this report for 2015 and past years, visit: <http://www.crmc.ri.gov/aquaculture.html>

- 61 farms employing 171 farm workers with 241 acres in cultivation
- Oysters remained the number one aquaculture product with 8,272,172 sold for consumption, an increase of 725,040 oysters from last year
- The farm gate value of aquaculture products for consumption was \$5,433,948
- Overall, oyster acreage is increasing at a rate of 12 acres per year and number of farms is increasing by 2.8 farms per year.
- Rhode Island only represents 2.3% of the total oyster production on the east coast of the U.S

What is the state’s aquaculture permitting process, at a glance?



What are the steps to oyster aquaculture?

There are three basic steps to growing oysters: 1) raising larvae in a hatchery, 2) growing them to hardy size in a nursery, and 3) growing them to market size in the Bay or ponds (i.e. farming stage). This third stage takes the most time, 1-2 years, and generally begins in the fall.

What types of gear are used to grow oysters to adult size?

Oysters can be reared on the bottom directly and harvested using a small dredge. They can also be reared on the bottom in different cage or rack and bag systems. These oysters are tended to and harvested by small boat or barge. Another option for rearing oysters is in mid-water on suspended lines or hanging cages. And the final option for rearing oysters is on the surface in floating cages or bags.

What are some of the ecological and social services oyster aquaculture provides?

Oysters are excellent water filters, improving the water quality in the area they are being grown in. They also remove excess nutrients from the water and provide habitat for other species such as juvenile fish. The oyster aquaculture industry helps to provide jobs in the state and sustain a working waterfront directly and through ancillary marine-related jobs.

What are some public concerns about aquaculture in RI?

Some concerns from the public include: Perceptions of the past industry and its collapse; seeing new activities on the water and in new places as aquaculture grows; conflicts between different commercial and recreational uses on the water; and lack of knowledge on what the social carrying capacity of our water bodies is to support various activities on the water, including aquaculture.

What are some fun facts about oysters?

- Ⓢ An adult oyster can filter out 50 gallons of water per day in the summer.
- Ⓢ A pearl starts out as a grain of sand or any irritant that enters the oyster's shell. While pearls are more common in the Pearl Oyster which is a close relative to the species grown in RI, almost all bivalves can produce a pearl.
- Ⓢ Oyster shells are great for your garden. The calcium in the shells can help balance the pH of the soil. Once you crush up the shell it will also help drainage; you can add the ground up shell directly to you garden bed or into your compost pile.
- Ⓢ It only takes an oyster 2-3 weeks to find the home of their dreams. Once oysters settle out of the water column and onto a hard substrate, they cement themselves there for permanent residency.
- Ⓢ The flavor of the oyster mostly comes from the body of water in which it is grown; and a bit from the technique (on the bottom or off bottom).

Questions asked during the webinar on October 24, 2016

Q1: Are the ones [oysters] they are finding native?

A1: Most are native (eastern Oyster) but sometimes you will find the European flat oyster which is not native.

Q2: Are adult oysters at all mobile?

A2: No, once they settle on to their substrate they are cemented for life.

Q3: Is there any regulation as to the number that is sent to farm and broodstock?

A3: No, regulations for the number of oysters sent but there are testing regulations to minimize the risk of transferring oyster diseases

Q4: What phytoplankton types do oysters consume and how much do they eat?

A4: Oysters are very indiscriminant in terms of what they eat as long as the particles are in the right size range (from about 2 microns to 25 microns). After they filter out the particles, they sort them at the mouth region where the indigestible particles are rejected as pseudo feces while the "good stuff" is moved into the mouth.

Q5: Why do you believe that oysters are the primary aquaculture in RI versus other species such as fish?

A5: For now we have no good candidate species of marine fish that can be cultured in RI. If you look at the current aquaculture sales, over 99% of the cultured marine species are oysters.

Q6: Could you expand on biofouling?

A6: Biofouling is a major problem for shellfish growers. Because all of their stock is raised in mesh bags or cages, if the mesh should be plugged up by the variety of critters that naturally grow in the Bay then the shellfish will be deprived of food and eventually oxygen due to restricted flow. The aquaculturists spends much of their time cleaning cages and bags to prevent fouling from impacting their farm, similar to what people do to keep fouling off the bottom of their boats.

Q7: Could you expand on the difficulty and solutions to algae etc. on fouling?

A7: Growers use air drying effectively to control fouling. Most of the fouling organisms are not as hardy as the oyster so they will die with air exposure that doesn't affect the oyster. Other techniques for controlling fouling include dipping their oysters in a saturated brine tank or cleaning the fouling off with a pressure washer.

Q8: Have we begun to approach the capacity of the ponds to support more farms, considering water cleanliness and social use?

A8: A study completed a few years ago looking at the ability of the ponds to support oyster farms and at what level oyster farms would start to impact the natural production of the ponds. At this point in time, we are not anywhere near approaching "biological carrying capacity" of the ponds. I believe that the study concluded that we could increase oyster farms by 400% before we saw any impact, especially given the amount of nitrogen entering the ponds from upland sources. We will never approach that level of oyster farms given the apparent "Social Carrying Capacity" of the region.

Q9: I know that we will be discussing the "5% regulation" next time. But, shouldn't we, even now, be considering all practical limitations to expansion, such as limiting recreational use?

A9: Currently, we are harvesting shellfish at a sustainable rate and oyster aquaculture fits right into that scenario. Given the contribution of nitrogen into our ponds and estuaries, it is advantageous for use to remove those shellfish as they represent a constructive means to remove excess nitrogen from the local waters. Plus, our shellfish are a healthy and environmentally friendly food resource in a world where food security is becoming more of a concern.

Q10: Do you have a link to that study? I would be interested to read further about this.

A10: The work was completed by Carey Byron at URI (her PHD dissertation) and she published her results in a number of papers. You could Google Carey and URI and her papers may come up. Otherwise, I can get those references later.

Q11: Thank you, but I was concerned more with farming in our more shallow pond sites (Potter's Pond, for example). The low-hanging cages prevent some recreational craft from using that area. Thoughts?

A11: This is why we have the 5% rule, leaving the remaining 95% for other users, including recreational craft uses.

“Aquaculture and You” - Frequently Asked Questions

Shellfish aquaculture is growing in Rhode Island. As it grows, more people have questions about the farms they are seeing. These “Frequently Asked Questions” are provided by CRMC and intend to provide information to boaters, fishermen and the general public.

Source: <http://www.crmc.ri.gov/aquaculture/aquaculturefaq.html>

What is grown in RI? Currently all of the farms in the state’s waters grow shellfish with the vast majority being oysters. Additionally the state cultures fish for stocking freshwater fisheries and for restoring coastal habitats.

Who regulates aquaculture in Rhode Island? The RI Coastal Resources Management Council (CRMC) is the lead agency for all aquaculture in RI. The Council works with Department of Environmental Management, the Department of Health, fishing groups (both commercial and recreational), towns, federal agencies, and environmental organizations when permitting an aquaculture lease.

Does the state give the submerged land away? The area occupied by an aquaculture farm is not given away. The water and land beneath it belongs to all of the citizens of the state and is held in trust for all of its citizens. The area is managed under the “Public Trust Doctrine” for everyone. Aquaculture farms can get a limited lease of the submerged land from the state, they do not own it. In fact the lease area is not an exclusive lease and still can be used for many other uses. If a farmer abuses the lease provisions, the state can revoke the lease.

Can any area be leased? No. In consultation with fishing groups and other regulatory agencies, there are many restrictions on which areas can be leased. Areas that support a wild harvest of shellfish, areas of eelgrass, navigation areas, etc. are examples of areas not suitable for aquaculture farms.

How long do the leases last? CRMC has set the lease maximum length at 15 years. Leases are renewable by the farmers upon submission of an extension request upon expiration of their lease providing the farmer has continued to abide by the conditions in the lease.

What does the farmer have to do to maintain the lease? The lease must be actively farmed and comply with all of the conditions of the permit. The farmer has to post a bond to enable the state to remove the gear in case of default and the farmer has to sign a lease and pay a yearly lease fee. Failure to comply with any of the conditions of the lease can result in the lease being revoked.

Are there limits on the amount of area that can be leased? Yes, the CRMC, in consultation with the fishing industry and other regulatory agencies, has developed guidelines that restrict aquaculture to a maximum 5% of any coastal pond.

Can I use the farm area too? Yes, within limits. The public can pass through a farm, however it is illegal to disturb the farmer’s gear or harvest his stock. At all times mariners are expected to use caution and common sense when traversing farms. When in doubt, ask the farmer or the Aquaculture Coordinator at the CRMC.

How is shellfish disease managed? The first thing to remember is that we are talking about diseases of shellfish only. None of the diseases that seed are tested for are capable of affecting humans. The state does not allow shellfish with diseases capable of affecting humans to be brought into the state. A report from a certified disease specialist certifying the seed as disease-free must be supplied to CRMC prior to any permission being granted to import shellfish seed into the state. CRMC also has an Aquaculture Biosecurity Board to ensure the rules are kept up to date.

Will the state allow marine finfish farms? Possibly, but it would be very difficult to permit a finfish farm in RI waters. One of the problems we already have is excess nutrients polluting the state's waters. A marine finfish farm would add to this problem of excess nutrients from fish feeds and fish wastes. Finfish farms are already prohibited in the coastal ponds because of this pollution concern.

Then why allow shellfish? Shellfish are filter feeders that consume algae from the water. The farmer does not feed them, thus there are no added nutrients. Additionally shellfish filter algae from the water, up to 50 gallons per day for a large oyster, and this helps clean the water. It is generally accepted that shellfish aquaculture is a net benefit for the environment.

How can I learn more about aquaculture? There are a number of ways. On the CRMC web page there are a number of articles, regulatory information, presentations and links to other sites. The web address is: <http://www.crmc.state.ri.us/projects/aquaculture.html>. Another way to learn more about aquaculture is to ask the farmer. Please use common sense in approaching farmers; they are working to make a living.

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Q1: Are the ones [oysters] they are finding native?

A1: Most are native (eastern Oyster) but sometimes you will find the European flat oyster which is not native. [Additional info: The European flat oyster is naturalized, non-native introduced by F&W officials in the late 1800's.]

Q2: Are adult oysters at all mobile?

A2: No, once they settle on to their substrate they are cemented for life.

[Additional info: Occasionally oysters can get carried away by algae or a crab. Sometimes they will sink down in the sediment and their feeding activity will bring them back to the surface.]

Q3: Is there any regulation as to the number that is sent to farm and broodstock?

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[Additional info: This is not actually why we have the 5% rule (which was established to ensure we do not exceed the ecological carrying capacity) but it does ensure that 95% of the area is available for non-farm uses.]

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