Study: Rhode Island waters can support continued growth of oyster aquaculture

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The rapid growth of the oyster aquaculture industry in Rhode Island has raised questions about how many oyster farms Narragansett Bay and the state's salt ponds can support. But a study by a University of Rhode Island graduate student has found that these ecosystems can withstand continued high rates of aquaculture growth without causing ecological harm.

Carrie Byron, a doctoral student in the URI Department of Fisheries, Animal and Veterinary Science, examined the ecological carrying capacity of the waters that currently contain leases for oyster aquaculture in the state, including Narragansett Bay and five South County salt ponds.

"The farms are part of a greater ecosystem, and we want to make sure the whole system remains healthy," said Byron, a native of Mansfield, Mass. "The affect of the oysters doesn't stop at the farm boundary - it extends from the bacteria in the system to the birds and the top predatory fish. We identified all those key species that are active players in the system."

What she found was that Narragansett Bay could support the growth of 1.3 tons of oysters per acre, whereas just .002 tons of oysters per acre are currently being harvested from these waters. The carrying capacity of the salt ponds is 3.2 tons per acre, and farmers now harvest about .05 tons per acre.

At present farming density rates, this means that nine percent of the surface area of Narragansett Bay and 46 percent of the surface of the salt ponds could be leased for oyster aquaculture before the waters would suffer adverse effects. Less than two percent of these waters are being used for aquaculture today. State aquaculture regulations indicate that no more than five percent of the surface waters of the salt ponds can be leased for aquaculture.

"I was expecting to be surprised by my results, but it was still surprising," Byron said. "I knew there was a lot of food out there for oysters, but I didn't know there was that much."

The major difference between the carrying capacity of the Bay and the salt ponds is due to the quantity of zooplankton in the waters.

"Zooplankton in the Bay are very heavy grazers on the same food the oysters eat, so there is competition for that food," Byron said. "Zooplankton come into the Bay from the ocean, and they are not coming into the ponds nearly as much, so there is less competition for food in the ponds."

Byron noted that Rhode Island's aquaculture industry, while small compared to other parts of the world, has great potential for continued growth due to the abundance of microscopic organisms upon which the oysters feed.

By comparison, she said that the carrying capacity of oyster aquaculture in New Zealand, which has a very large aquaculture industry, is just 0.3 tons per acre, far below the 1.3 and 3.2 tons per acre in Rhode Island waters. According to a study published five years ago, New Zealand farmers harvest oysters at a rate of 0.1 tons per acre, about double the rate as in Rhode Island.

Byron's study is the result of concerns expressed over the high rate of growth of the aquaculture industry in Rhode Island. An aquaculture working group convened by the R.I. Coastal Resources Management Council requested the study to enable the group to make recommendations about how best to manage the industry's growth.

Byron said that there are other issues besides the ecological carrying capacity that regulators must address when determining the future of the industry, including conflicts with other users of state waters, but her study is an important first step.

"This is likely the most detailed scientific determination to date of ecological carrying capacities for shellfish aquaculture for a large estuary and coastal lagoons anywhere in the world," said Barry Costa-Pierce, director of Rhode Island Sea Grant and Byron's advisor. "Carrie has completed not only a massive exercise in data mining and modeling, but also translated these findings to a very engaged, statewide group of stakeholders. Her results will impact shellfish aquaculture developments locally and globally."

Provided by University of Rhode Island

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