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WSG-Funded Researcher Takes on Willapa's Troublesome Oyster Drills

A deeper understanding of these non-native mollusks leads to their undoing

By Carolyn White

Located on Washington's ocean coast, due north of the Columbia River, Willapa Bay is the number-one oyster producer in the U.S. and among the top five oyster producers worldwide. The bay is also noteworthy for its large populations of oyster drills — non-native marine snails that feed on oyster flesh. Well established in Willapa Bay, oyster drills can cause substantial damage to the resource and to the shellfish growers and others who earn their livelihoods from farmed oyster sales.

To make a meal out of an oyster, an oyster drill uses its raspy tongue (called a radula), which works like a rat-tail file to make a small hole in the oyster's shell. Next, the drill secretes digestive enzymes into the hole, through which the snail sucks up the partially liquified flesh. An adult oyster drill is capable of consuming up to three small oysters per week.

Two kinds of oyster drill exist in Willapa Bay: the eastern oyster drill (*Urosalpinx cinerea*) and the Japanese oyster drill (*Ocinebrellus inornatus*). Both species were inadvertently introduced along with imported oysters, brought into the state to replace

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Jennifer Ruesink, in the oyster beds of Willapa Bay at low tide

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the over-harvested native Olympia oyster. Some native snail species — whelks, for instance — drill similar holes in shelled prey but appear not to be a threat to oysters.

Jennifer Ruesink, an Associate Professor in the UW's Department of Biology, has been examining the impacts and dynamics of the Eastern and Japanese oyster drills in Willapa Bay. With financial support from Washington Sea Grant, she and her research helpers painstakingly collected and marked thousands of oyster drills with color-coded vinyl tags, over a period of two years. The tagged drills were released and, later, recaptured, enabling Ruesink to glean important information about the growth, survival and reproductive rates of these snails.

Ruesink explains that, while basic life history information about the two oyster drill species was already known, the "transition probabilities" had not been established. These numbers tell scientists how many drills at one stage in the life cycle will develop (or "transition") into the next life stage. "Knowing those transition probabilities is essential for the rational management of pest species," she says.

The collected data on drills were entered into population models to help identify vulnerabilities at various stages of the oyster drills' life cycles. In the process, Ruesink and her team learned that while the Japanese oyster drill was historically considered to be the more harmful invader, it actually had a much lower survival rate — less than 10 percent annually — than that of the Eastern oyster drill — around 30 percent. Ruesink suggests the low survival rates may be due to predation by native red rock crabs.

"Crabs are a fairly major selective force for snails," the WSG-funded researcher says. "If you look back in the fossil record, you can see that as crabs evolved, the shells of snails became thicker, probably in self-defense."

Because the introduced snails don't have an "evolutionary history" with the native crab species in Willapa Bay, they may be particularly vulnerable to predation pressure.

In addition to gaining important information about adult survival rates, Ruesink's research is also shedding light on oyster drill eradication methods. "It turns out that destroying the oyster drills' egg capsules is much more effective than removing the adults," she says. "So it's important to time any control measures to the drills' egg-laying cycle — typically from April to July.

"The drills lay their eggs in the cracks and crevices in clusters of oyster shells," says Ruesink. "A screwdriver works really well for getting at the egg capsules, even in these tight spaces."

Ruesink has been sharing her preliminary findings with oyster growers, who have been quick to adopt her suggested control methods. Now, when the growers visit their oyster beds, they take with them buckets, screwdrivers and a better understanding of the coastal environment in which they work.

Two oyster drill species — Japanese (left) and eastern (right) — poised for a photograph