The Natural Laboratory Podcast Transcript: Understanding the ecology of native Olympia oysters in Tomales Bay

Introduction

This is the Natural Laboratory, a podcast exploring science for Bay Area National Parks. I'm Cassandra Brooks.

Tomales Bay is known for its thriving oyster farms, where they grow Pacific oysters, a massive and fast growing species from Asia. Less well known are Olympia oysters, the species that's actually native to the Bay. Despite their small size, usually less than a couple inches, they were an important food source for American Indians and early settlers. They also played an incredibly important ecological role in Tomales Bay. As filter feeders, they cleaned the Bay's waters and the built reefs with their shells, providing habitat and shelter for other marine species.

But you won't see an abundance of Olympia oysters in most parts of the bay today. Their popularity as a food source coupled with pollution caused populations to plummet by the early 1900s. Despite a lack of harvesting for almost a century, they still haven't recovered in Tomales Bay.

UC Davis professor Ted Grosholz and his students have been studying the oysters for more than a decade. They're trying to understand what limits the oyster's recovery and provide information for potential restoration efforts.

Anna Deck Interview

[Sound of water lapping]

Cassandra Brooks: *I am out here with Anna Deck a graduate student in Ted Grosholz's lab.*

So why they heck are we out here at 10 o'clock at night? Its crazy foggy right now and the tide is starting to come up…

Anna Deck: *So right now is the low tide. Oysters are generally found in the intertidal zone and in fall the low tides tend to be in the evenings and that's when oysters are exposed.*

One of the things we're looking at is whether competition for food or space limits oysters either in their growth, survival or their recruitment.

Ted Grosholz interview

Ted Grosholz: *Hi, I'm Ted Grosholz, I am a professor at UC Davis.*

CB: *I was hoping you could describe what Tomales bay looked like a few hundred years ago, a hundred years ago and then what it looks like today.*

TG: *Tomales Bay, this is all conjecture for putting together a lot of information, but several hundred years ago it probably looked very different than it did today. Prior to the advent of land use change it probably had a much more diverse shore line. It probably had lots of rocks and cobbles. It probably had a very healthy native oyster population.*

Probably a hundred years ago or just thereabouts it was also a very active fishing village, but there were quite a range of land use changes, involving grazing and a number of activities that contributed to silt and sedimentation. There was a lot of sediment that came into the bay and it filled in much of the bay, as much as 15 feet in some places. So we had a bay that had a very diverse shoreline transition into a very soft sediment, very silty area.

If we were to go out to Tomales Bay right now, the first thing that would strike you is the shellfish aquaculture. The west side of Tomales Bay, with the National Park Service boundary, certainly represents a little more of what Tomales Bay probably used to look like.

Ted Grosholz Interview (continued)

CB: *You describe the differences in the habitat change in Tomales Bay, is the habitat change the primary reason the oysters have become depleted over time?*

TG: *This is the question we spent several years trying to answer, if the native oysters haven't been fished for a hundred years, why don't we have a lot of oysters? Why haven't they recovered? Like most ecological process, its complicated and based on several different factors. But we suspect that the lack of hard substrate that has resulted from land use changes is probably part of it. We also have several introduced predators and from our work we know these have an important impact on native oysters.*

David Kimbro Interview

CB: *To find out more I called Ted's former graduate student David Kimbro who did his PhD dissertation on how invasive species introductions have impacted Olympia oysters in Tomales Bay.*

David Kimbro: *All throughout the bay you have three tropic levels, you have a crab, a snail or whelk and oyster. In one half of the bay you have crabs at healthy numbers, snails at healthy numbers and oysters at healthy numbers. On the other half of the bay where oysters were historically more abundant, you have crabs, a lot more snails and you have absolutely zero oysters left.*

What's the difference between the halves of the bay? The outer half is all native organisms and the inner half is all invasive crabs and whelks.

It's like in the outer half the native crab and native snail or whelk have spent a lot of time around each other. So the native crab knows what to do when it comes across a whelk, it can easily crack its shell open and consume it. At the same time the native snail knows what to do when it senses a native crab, it gets the heck out of the way and migrates higher up on the shore and eats barnacles. In contrast the invasive whelk in its source population in long island sound it wasn't around big bad predators. So it hasn't been selected to have this sort of "I better watch out for crabs." So it munches through oysters happily and worry-free. And at the same time the European green crab is a generalist predator and eats everything, and as a result its not a whelk specialist. It has a hard time cracking open the large snails, so while it can eat a couple of these snails, it can't mow through them like the native crab can. So there is sort of a mismatch between predator and prey strategies here.

I did notice before I left that there is a new whelk a Japanese whelk. These dynamics I just told you about might completely change in the next year or two if the Japanese oyster drill numbers become more of an important factor.

Conclusion

We have yet to see how this new invasive species will impact Olympia oysters. But Ted and his students will continue trekking around all hours of the day and night trying to understand more about the oyster's ecology.

With the Pacific Coast Science and Learning Center, I'm Cassandra Brooks.