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: So, I'm out here with Anna Deck a graduate student in Ted Grosholz's lab.

So, why the heck are we out here at 10 o'clock at night? It's crazy foggy right now. Definitely, the tide is starting to come up and…

Anna Deck: Yeah, so, right now is the low tide, so...[chuckles] Uh, oysters are generally found in the intertidal zone and, so, in fall, the low tides tend to be in the evenings and that's when oysters are exposed. So, one of the things we're looking at is whether competition for space or food limits oysters either in their growth, survival, or their recruitment.

Ted Grosholz interview

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

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

TG: Let's see. Tomales Bay probably...this is all conjecture for, you know, putting together a lot of information, but several hundred years ago, um, it probably looked very different than it did today. So, uh, prior to all the...the advent of...of land use change, it probably had a much more diverse shoreline. It probably had lots of rocks and cobbles and probably had very healthy native oyster populations.

Probably, a hundred years ago, or just thereabouts, um, 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 which contributed a lot to silt...silt and sedimentation. So, 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. And, so, we had a bay that had a much more diverse shoreline transition into a very soft-sediment, uh, silty area.

You go out to Tomales Bay right now, the first thing that would probably strike you is the shellfish aquaculture. The west side of Tomales Bay, uh, 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 difference in the habitat change in Tomales Bay, is that, primarily, why the oysters have become depleted over time?

TG: Uh, this is the question that we spent several years trying to answer is, well, if the native oysters haven't been fished for a hundred years, why don't we have a lot of native oysters? Why haven't they recovered? Like most, uh, ecological processes, it's complicated and based on several different factors. But we suspect that the lack of hard substrate that has resulted from the 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 Ph.D. dissertation on how invasive species introductions have impacted Olympia oysters in Tomales Bay.

David Kimbro: All throughout the bay, you have three trophic levels. You have crab; a snail or whelk; and an oyster. Right? But in one half of the bay, you have crabs at healthy numbers, snails at healthy numbers, and oysters at healthy numbers. In the other half of the bay, where oysters historically were more abundant, you have crabs, you have a lot more snails, and you have absolutely zero oysters left.

So, what's the difference between the halves of the bay? The outer half is all native organisms and the inner half is all, you know, invasive crabs and invasive whelks.

It's like in the...in the outer half, like, the native crab and the native snail or whelk have, sort of, spent a long 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. It, sort of, 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 crab predators. So, it hasn't been selected to, sort of, have this "I better watch out for crabs." So, it just, sort of, munches through oysters happily and worry-free.

And, at the same time, the European green crab, it's like a generalist predator, it...it eats everything. And, as a result, it's not a whelk specialist. And, so, it has a hard time cracking open these large snails. And, so, while it can eat a couple of these snails, it just...it can't mow through them like the native crab does.

I did notice before I left, was it...there's a new whelk, a Japanese whelk. And these dynamics that I told you about, they just might completely change in the next year or two if the Japanese oyster drill numbers become more, uh, 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.