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Ask an Eco Expert: Dr. Alyssa Gehman

by Sheri Radford / Oct 5, 2021

We talk to a marine disease ecologist about this summer’s catastrophic heat dome

At the beginning of the summer, the west coast of North America experienced a heat dome, complete with record-breaking temperatures for many areas. The tiny town of Lytton in British Columbia hit 49.6 Celsius, the highest temperature ever recorded in Canada. Scientists have shown that these extreme heat events were [almost certainly caused by climate change](#).

Dr. Alyssa Gehman is a Vancouver-based marine disease ecologist at the [Hakai Institute](#) and an adjunct professor at the [UBC Institute for the Oceans and Fisheries](#). She studies climate change and disease in marine systems.

We talked with Dr. Alyssa Gehman about what she witnessed at a Vancouver beach during the heat dome, what people can do to help scientists and more...

E911: What did you see and experience during this summer’s heat dome?

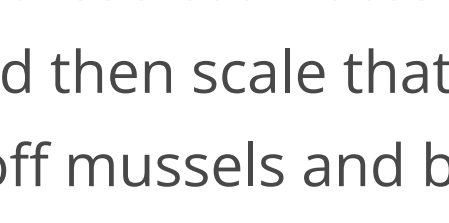
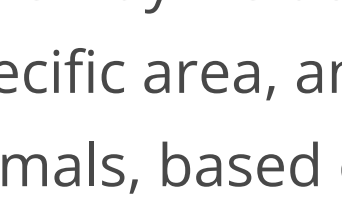
Alyssa: I was worried ahead of time, because I knew that this big heat wave event was going to happen right during the lowest low tides of the year, so in the most vulnerable time for animals that live in the intertidal zone. I was a little concerned ahead of time, but not as concerned as I should have been. It was much worse than I had anticipated.

I live in an apartment, and I was quite hot myself. I decided I would go for a swim, so I walked down to Kits Beach. Immediately at the shoreline, I could smell dying shellfish, which is, unfortunately, a smell I know very distinctly. Immediately I was like, "Oh, no, I think everything here is cooking." I started to look around, and that was when I saw whole areas of mussel beds with the shells popped up. That is not how mussels should be during low tide. If they're popped open, and there's still tissue inside, you can see that they died from heat stress.

And then I actually did still try to go swimming, because again, I was very hot. As I was getting in the water, a dead crab floated past me. And that was the point at which I was like, "You know what? Maybe not."

I work with a research group that studies the effects of climate change on these animals. I think all of us had been a little worried ahead of time, but we couldn't fully fathom how hot it was going to get during that heat dome. It was a startling event for all of us. Eye-opening.

E911: How many marine animals died during the heat dome?



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Alyssa: The way we do these estimates is we measure an area and estimate the mortality in that specific area, and then scale that up to the whole region. Our first number was a billion animals, based off mussels and barnacles, mostly. That was the first estimate, right after the heatwave. Since then, each member of the lab has gone to different areas of the British Columbia coast and done some quantification. I can't give you new numbers, because we're still in the process of doing this, but what I can tell you is that a billion is definitely a low estimate. There's just a huge amount of mortality.

E911: What stretch of coastline does that estimate cover?

Alyssa: Our original estimates were for the [Salish Sea](#), so that does include Washington. There is an ongoing collaborative project to estimate the mortalities. Our research group includes Washington researchers as well as virtual researchers. We're putting together all of our information to try to understand what animals died.

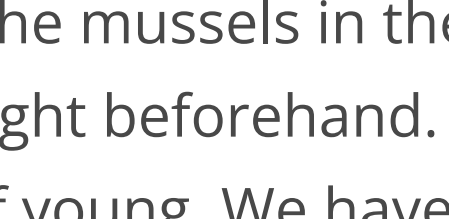
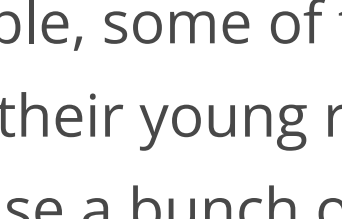
Specific animals are indicators for the rest of the ecosystem. Mussels and barnacles are easy to see and quantify. We can tell when they've died, because of the way they attach themselves to the rocks. They stay there after they've died. It is very likely that the mortality we're seeing in these obvious and easy-to-see animals is indicative of higher levels of mortality in other animals as well.

Mussel beds, in particular, tend to have other things living inside them, and those are harder to see. Crabs, snails and limpets [aquatic snails] all live in between the mussels. It's going to take us longer to figure out what happened to those populations.

E911: What is the ripple effect of all those deaths?

Alyssa: Many animals eat these mussels, so having this mass mortality means that there will be fewer mussels available, especially this fall. There is a concern that there won't be enough food for some migrating birds at their stopover sites. If they can't eat the mussels, they might turn to some other food source, which isn't used to being the primary food source for these birds. And so you might end up seeing a decline in whatever else they eat. That's a multi-level, potential ramifying effect.

The other thing is that all of these animals are filter feeders. They remove objects from the ocean by eating them. Having that huge amount of filtering stock gone could lead to there being more plankton in the ocean, which could start to shade out eelgrass beds. We don't actually know whether this will happen, but it is something that we're worried about.



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One thing to note is that while we had these huge mass mortalities, and some things that died will take a long time to recover, some of the animals that died are quite resilient to this kind of event. Their life cycle involves mass mortality, just not quite to the extent that we saw.

For example, some of the mussels in the Salish Sea tend to respond to high mortality by releasing their young right beforehand. It's like a trigger: if they know they're going to die, they release a bunch of young. We have seen evidence of incredibly high recruitment following these events.

They're quite likely to be able to recover in some locations—not all of them, and probably not fast enough for the birds to have feed this winter, but there's definitely hope that some of these animals are going to be able to recover. It's just if these sorts of events happen more frequently, then it becomes a very long-term issue.

E911: Is there anything that an average person can do to help?

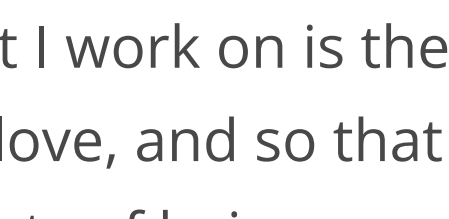
Alyssa: We do have a [citizen science component](#), to help us quantify the mortality event. It's specifically for barnacles because they stay on the rock longer. If you have an hour and have a beach nearby that has rock, you can go and take pictures of the barnacles, and then we can quantify the mortality of those barnacles. It's super helpful because there is a lot of variability. British Columbia has such a varied coastline and many different habitats in our marine system. It helps us to understand what happened during this heat event, and what might happen in future heat events.

The other option is, if you have documentation or images from the heat dome, you can upload those onto [iNaturalist](#). That's for any other species besides barnacles. iNaturalist makes data available to scientists in the region.

E911: How did you get started studying coastal ecosystems and their relation to climate change?

Alyssa: I was very lucky. I grew up in Seattle, and I had an amazing marine science course in my high school. That got me hooked. I think it might have been the first class that I understood we don't know everything. It was taught in a way to show that the science was still being learned, and that really intrigued me. I also love the ocean.

I learned about climate change when I was in college. We have so much to learn about how animals are going to respond. It also became clear that no matter what you studied, you were going to be studying how climate change affects it. As ecologists, we're trying to understand what is happening in our ecosystem. It's almost impossible to study that without acknowledging climate change at this point.



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E911: In your job, how do still have hope and not get depressed?

Alyssa: On the one hand, it is depressing. We're working about this one heat wave event, but a major project that I work on is the star wasting disease. It's this massive mortality event of animals that I love, and so that is fundamentally very sad. The way I deal with it is I allow myself moments of being very sad. I sit with that emotion.

Then there is a parallel where, if we understand what's going on, we might be able to do something about it. And so that becomes a motivator for me. It's puzzles that you're trying to put together, to understand what happened to these animals. I think the search for the answer is the motivator.

I study climate change and disease in marine systems, and I find these interactions totally fascinating, so that helps. But I would much prefer to be talking to you about the amazing life cycles and the amazing systems that exist instead of about how they're dying.



E911: How can we get the next generation to want to learn about these things and help solve the problems, without depressing or overwhelming them?

Alyssa: I run two-week marine science trips for high-schoolers to Maui. That was part of what got me started: I went from the same public high school to Maui when I was 16. So I've been going to the same locations since I was 16, which means that when I go, I see the destruction of the reefs.

Every time I run this trip, I have an internal battle of how to make sure that this generation gets to experience and love and be amazed by what they can see, but also make sure that their baselines aren't shifting. They need to know that what they're seeing is different from what I saw when I was 16, but not be instantly told that it's not as beautiful as it used to be.

What I found from that is really starting with the love of the space, enjoying nature, getting excited about being there, and *then* you learn about the issues and the changes. But it is hard. I also think that this next generation does care a lot, so that's exceptionally exciting.



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