

Golden Gate Climate Update Transcript

Interview with Dr. Emily Limm
Post-doctoral research scientist, U.C. Santa Cruz
Interviewed on November 3, 2009

James Osborne interviewer

Part 1

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James - Hi, I'm Ranger James Osborne, and welcome to Golden Gate Climate Update, your source for information on climate change and sustainability. Join us as we hear from people helping your National Parks understand and adapt to climate change.

Today we are talking with Dr. Emily Limm, who recently received her Ph.D. in integrative biology from U.C. Berkeley, where she studied how the ferns, shrubs, and trees of the redwood forest absorb fog and how this vital water source maintains the health of the redwood forest. So Emily, can you tell us why fog is so important to redwood forests and what other factors may affect their distribution?

Emily – Well in California the summers can be very long and dry, because most of the rain falls here during the winter. So fog makes the forests cooler, more humid, and it provides extra water. And the redwood forest plants in particular are able to directly absorb this water above ground through their leaves. And this extra water supports their growth during the summer and prevents them from experiencing severe drought stress as the soil dries out during the summer. It helps sustain the forest where it is today along the coast of California, and so when temperatures increase and rainfall inputs decrease as climate changes, the fog may or may not be able to help sustain the redwood forest ecosystem where it is today in its current range.

James – So of course the effect of climate change on rain as well as fog becomes real crucial doesn't it?

Emily – Yeah, both are important, especially because fog happens at a different time of year than rain. And so both need to happen in order to give the redwood forest enough water over the course of the whole year.

James – I see. Since fog is central to your research; can you tell if scientists are seeing any changes in coastal fog patterns in California and if any predictions can be made for future fog patterns as the climate changes?

Emily – Sure. Well the best evidence that we have so far looks at climate records that go back a hundred years. And it appears that over the last fifty years or so, the frequency of fog has been decreasing. So we are having fewer days during the summer when it is actually foggy. Now if this trend continues, it looks like the redwood forest will be experiencing even less fog in the future, which would reduce how much water it takes in.

James – Wow. Now can you tell us what role ferns and shrubs play in redwood forest ecology and what your research suggests may happen to redwood forest distributions in the future?

Emily – All of the plants in the redwood forest ecosystem, whether they are the tall redwood trees or the small shrubs and ferns on the forest floor, create the architecture of the ecosystem, and they cool down the forest and they strip fog out of the air, bringing water into the ecosystem. So while they're doing all of those things, they're also actually providing the food and shelter for animals. What we see when we go into the redwood forest today is that there are already fewer ferns in the south end of the redwood forest range, and this reduced fern cover is likely due to less rainfall in the south, and as climate changes, if it gets drier and there is less water available, more species may die in certain parts of the redwood forest ecosystem. And that would have cascading consequences for animals that depend on these plants for their own survival.

James – I see. And you actually notice the fern distribution changing faster than the redwood?

Emily – The fern's lifespan is shorter, so we do see a change in the size of the ferns and how many ferns there are; it can happen within a few years, and we're in the middle of monitoring that right now. Trying to pick up how the populations have already changed, but there is a big difference from the northern forests as you move down to the southern forests already in how abundant these ferns are.

James – Wow. So would you say that ferns are an indicator species for the whole redwood forest ecosystem?

Emily – They are definitely an indicator species. They respond very strongly to a lack of water in the environment. They also respond very positively when they get enough water. And so when it is foggy and extra water is brought into the ecosystem, we see small plants like ferns and other understory plants doing much better and being more abundant.

James – Before we move on to our next question, its time for the climate update challenge. Today's question is; how many trees were killed in

Hurricane Katrina? Hear the answer, and the second half of this interview in part two. This is James Osborne; thanks for listening.

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Male voice - Golden Gate Climate Update is produced by Will Elder and is a product of the Earth to Sky Program, an innovative partnership between the National Park Service and NASA.

Music from *A Walk in the Desert* by Electronic Symphonic