Golden Gate Climate Update Transcript

Interview with Dr. David Ackerly

Professor of Integrative Biology at U.C. Berkeley

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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. David Ackerly, Professor of integrative biology at UC Berkeley, who studies climate change and botanical response in California. Dr. Ackerly can you tell us a little about you go about predicting future plant distributions in California as the climate changes?

David - When we look at the distributions of plant and animal species, we often see that climate is one of the most important factors that influencing where those species live. One of the familiar examples here in California is the coast redwood - during our dry summer, redwoods take up water from the fog, and their distribution along the coast is closely tied to the distribution of fog. In our research, we use statistical approaches to look for patterns like this. The first step is to understand where species live now. We take a species such as the California Bay, where we have almost 200 individual locations based on data in museum collections. Using these data, we develop a statistical model that best describes where the Bay trees are found today in relation to temperature and rainfall patterns. The second step is to use that model together with forecasts of future climates, which comes from the work of the climate modelers. Putting those two pieces of information together, we can ask: In the future, where are the climate conditions going to occur that are favorable for the Bay trees? And what we see is that in many areas where they live today, the conditions in the future are expected to change too much, and we would not expect them to survive. On the other hand, their preferred climates shift and are found in new places in most cases, we predict that species would be able to live farther north than where they're found today, or higher up in the mountains. That's how the models work. The question is, how well do these forecast the actual changes that will occur over the next century. maybe the big established trees, with deep roots and lots of energy reserves, will be able to hang on,

even as conditions change. But if their seeds aren't able to germinate and or seedlings can't grow to maturity, then eventually these populations will disappear. For species such as the Bay trees to move into new areas, where they are not currently found, they will have to disperse their seeds, sometimes over long distances, to establish new populations. One of our biggest concerns is that the rate of dispersal of these seeds will be too slow to keep pace with changing climates, and those new populations won't be established any time soon.

James - So, speaking of climate change and the ability for plants adapt, you have said in the past that the rate of climate change today is greater than during past glacial and interglacial periods. What IS THE evidence that the current rate of climate change is greater and are their human factors that may limit how fast plants can respond?

David - Looking back at periods of rapid climate change in the past plays an important role to understand how plants and animals may respond to changes in the future. The most recent period of rapid change was after the last ice age. Starting about 18,000 years ago, there was a long warming trend over several thousands of years leading up to the modern day climate. We can look at the fossil record and also at geochemical signals to estimate how fast these changes occurred. Nowhere in the past record do we see evidence of changes that rival what is now projected for the coming century, in terms of the rate of change, the total amount of change and the fact that these changes are expected over the entire globe. When climates change, plant and animal species can either move, so they continue to occupy favorable conditions, or they can evolve and adapt to the new conditions. Both of these things take time. We're especially worried that the fragmentation of the landscape, due to agriculture and urbanization, makes it much harder for species to move around, and will impose a significant limitation on how fast plants can respond.

James - Before we move on to our next question, its time for the climate update challenge. Some good news for change. Why are forests in the U-S regenerating? 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