

Golden Gate Climate Update Transcript

Interview with Dr. Noah Knowles
Research Hydrologist, U.S. Geological Survey
Interviewed on November 3, 2009

James Osborne interviewer

Part 1

Music begins and fades slightly

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.

Sounds of ocean waves, sea birds and dogs barking in background

Today we are talking with Dr. Noah Knowles, a Research Hydrologist with the U.S. Geological Survey. One of Noah's areas of study is climate change and how it may affect the San Francisco Bay ecosystems, so for this interview we are standing on the bay shore at Crissy Field, where the park has recently installed a sea level rise exhibit that draws on Dr. Knowles research. So, Noah, can you tell us a little about your research on climate change and its affects on San Francisco Bay?

Noah - Well, I've looked at climate change and its impacts on the bay from a couple of different angles. First of all, the bay gets most of its fresh water from the Central Valley. San Francisco Bay is an estuary, a place where freshwater and saltwater meet, and the way freshwater flows into the bay, the timing of it and the amount that comes into the bay, is likely to change as temperatures warm and as the snowpack up in the Sierras diminishes. So, runoff is expected to come earlier in the year and change the patterns of salt in the bay. One of the possible impacts is an increase in the level of salt in the bay, which could affect ecosystems adversely in the bay. From the ocean end, I'm currently looking at the effects of sea level rise in the bay, and again that can cause more salty ocean water to come into the bay, so those two effects kind of combine, making the bay saltier, potentially. But also, as sea level rises, we expect to see low-lying areas around the bay becoming inundated that aren't inundated today. And so developing maps of those areas, the areas that are particularly vulnerable, is a lot of what I have been working on lately.

James - So, you have developed maps showing a 100-year flood event around San Francisco Bay using a predicted 1.4 meter sea level rise for the

year 2099. Can you tell us why you chose that amount of sea level rise, and how likely it is that that will happen by the century's end?

Noah - Well you're correct; I did do computer simulations of what would happen if we had a 1.4 m sea level rise. That is a value that is at the upper end of a range of predicted sea level rise. It varies from about a half a meter to 1.4 m by the year 2100, and various agencies in the state of California are considering that range. What I wanted to do was to simulate the very upper end, and what we in fact did was run a 100 year simulation that culminated at the end in a 1.4 m sea level rise, but that hit every increment along the way. So, we also did a half a meter sea level rise and one meter sea level rise. So we can look at all of those and by doing the very high end value, we were able to include the whole range of possibilities. But, that being said, the likelihood of us actually reaching 1.4 m is not that far fetched. I said that is the upper end of the projections. Currently we're tracking, in terms of greenhouse gas emissions, the upper end of the scenarios that were considered. So, the track we're on right now looks to be possibly that high.

James - Do you have any forecasts as to what may happen to the beaches at our coastal parks as the sea level rises? Do you have any suggestions on how the parks should manage these coastal areas?

Noah - Well, I'm sure there are plenty of people in the park service who have considered the specifics of potential actions and mitigation more than I have, but as far as particularly inside the bay here, we have some remaining wetlands around the edges of the bay, some restored habitat here at Crissy Field, and we have lost a lot of the original wetlands that were around the bay, the wetland habitat, but there's still some remaining patches. And as sea level rises, what has to happen with those wetlands is that they have to be able, in order to survive as wetlands, to accrete sediment and organic matter to keep their surfaces rising at the same pace as sea level rises. So, what they actually end up doing is maintaining their place within the tidal range. So if they are at sea level now, they stay at mean sea level. The question is whether they will be able to accrete matter that quickly? Is there enough sediment for that to happen? Can vegetation grow quickly enough to stay above water, essentially? And I know, it's not my area of expertise, but I know there are strategies to establish certain types of vegetation that tend to trap sediment. But another way to look at this is, the sea is going to rise, even if we don't know exactly how much, but we do know where the low-lying areas are that are not currently inundated but are likely to be. That's a big part of what my mapping effort was. And so, one thing we can do is be anticipating areas that are likely to provide new wetland habitat under sea level rise, and sort of set aside those areas and plan for that, as is possible. So that kind of planning is something that can be done.

James - Before we move on to our next question, its time for the climate update challenge. Ocean levels are rising as glaciers slide into the sea. In Antarctica, a record 31 billion metric tones of ice were lost in 2006. How does that compare with 1992, when scientists first began measuring Antarctic glaciers? Is that an increase of 18, 58, or 75 percent? Hear the answer, and the second half of this interview in part two. This is James Osborne, thanks for listening.

Music fades in and then out

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