

# **Earth to Sky Climate Cast**

## **Climate Change and the California Current at Point Reyes National Seashore – Part 1**

*[guitar music introduction and female singing]*

*[Frank Schwing – pull quote]*

Definitely we've seen conditions are now warmer than they were half a century ago.

*[guitar music in the background]*

*[Cassandra]*

Hi, I'm Cassandra Brooks, with the Pacific Coast Science and Learning Center at Point Reyes National Seashore and I'll be your host for this two-part episode of Earth to Sky's Climate Cast. Here in part one, we explore how climate change is impacting the California coast.

As one of America's greatest coastlines, Point Reyes National Seashore, which is part of the National Park Service, encompasses 71,000 acres, including 80 miles of unspoiled and undeveloped coast. This seashore, just one hour north of San Francisco, is home to more than one thousand species, including 32 threatened and endangered species. Millions of visitors come here every year to see the elephant breeding colonies or the historic Point Reyes lighthouse.

But climate change has come to the California coast, potentially threatening many species that make their home here.

Dr. Frank Schwing, an oceanographer with the National Oceanic and Atmospheric Administration (also known as NOAA), has been studying the California current, trying to discern how climate change is impacting the current and the ecosystem which depends on it. I drove down to the NOAA office in Pacific Grove, California to meet with Dr. Schwing and find out more.

*[Sound of car and then breaking waves]*

*[Cassandra Brooks]*

I was hoping you could start by explaining what the California current is and what affect it has on the ecosystem.

*[Frank Schwing]*

The California current is the eastern most wing of a giant clockwise gyre, or circulation, that covers the north pacific. The waters we get that enter in the waters off California and the west coast really originates in the sub-artic regions of the north pacific. As a result, these waters are relatively cold. But they are also very rich in oxygen, nutrients and a lot of other things that really make for a productive ecosystem. As they flow south, they combine with wind patterns in spring and summer that tend to drive surface waters off shore. This process is replaced by waters that come up from depth, which we call upwelling. So its bringing these deep water up to the surface, again they are very productive waters, so it's the equivalent of spreading miracle grow all over the surface ocean where it can encounter plants and animals that grow there. And that's why the ecosystem is so productive off the west coast.

*[Cassandra Brooks]*

Its difficult to know what affect climate change will have on the ecosystem off the California coast, Dr. Schwing says, but they're seeing changes in weather patterns as well as in the behavior and distribution of marine organisms.

To illustrate this point, he referred to a well-known study completed in the 1930s by scientists at Stanford University's Hopkins Marine Station. The researchers went out and sampled tide pools off of Pacific Grove to figure out what species lived there. As expected, they found a mix of cold and warm water species. Then ten years ago, scientists went back out and re-created the study to see how the species composition changed. This time, just 60 years after the first study, they found warm-water species in much higher numbers while the number of cold-water species had dropped.

*[Frank Schwing]*

Its clearly one nail in the idea that we are seeing a switch towards warmer water species in the California current.

*[Cassandra Brooks]*

So what does that mean for some of the bigger species, some of the fisheries say and some of the marine mammals?

*[Frank Schwing]*

It could be quite significant, particularly for species that aren't as mobile as others. The ones that can swim might start moving north. Species that are less tolerant of warmer

waters, such as salmon, may be more seriously affected in a negative way by climate change. But on the other hand we may see more warm water species, things like albacore and some of the tunas and other fish like that showing up in our waters.

*[Cassandra Brooks]*

Do your time scales go back far enough to discern whether these changes are actually human induced or just part of natural cycles?

*[Frank Schwing]*

The good observational record goes back about 50-60 years. And we do see some fairly robust trends in some of the record. Definitely we've seen conditions are now warmer than they were half a century ago, another very important change comes back to upwelling. Overall we are seeing more upwelling than 50 years ago but a lot of it seems to be occurring later in the year.

*[Cassandra Brooks]*

But if upwelling is increasing is that overall a good thing for most species? Does it mean there are more nutrients in the water?

*[Frank Schwing]*

Because it appears to be occurring later in the growing season it's the equivalent of planting your garden but not fertilizing it for two months, it's not going to do very well. That's the problem a lot of these species have, by the time the upwelling finally really kicks in it's too late for them, their eggs don't do well, the offspring starve. We've seen some significant problems like that with a number of species.

*[guitar music crescendo]*

*[Cassandra Brooks]*

We've certainly seen changes in the upwelling currents in recent years off the Northern California coast. Thanks to the work of coastal oceanographers like Dr. Frank Schwing who study this phenomenon and its effect on marine plants and animals, managers and policy makers will be better equipped to deal with the effects of climate change in the future.

Stay tuned for the second episode of climate cast to find out more about how climate change is affecting the Point Reyes National Seashore, the potential for dead zones off California and ocean acidification.

Earth to Sky's Climate Cast is made possible through an innovative partnership between the National Park Service and NASA. The theme music was composed and performed by Karen Savoca. Each episode is written and produced by employees and partners of the National Park Service. For more information on the NASA Earth to Sky Project, and to learn more about how climate change is impacting our national park system, visit [www.earthtosky.org](http://www.earthtosky.org).

*[guitar music crescendos, woman sings, and music ends]*