

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Hot and Getting Hotter**

On Monday afternoon as I left the cool office of my favorite dermatologist, who had just reminded me that I hadn't been doing very well on skin protection, I hit a wall of heat. When I started the car the thermometer glowed at 104 degrees. Not exactly normal for Santa Cruz.

Although as I dug into the historic temperature records, which go back to 1900, I discovered that September is typically the hottest month of the year, and peak temperature has been 100 degrees or hotter in 17 different years. The highest September temperature ever recorded was 108 degrees back in 1904.

Paddling off West Cliff an hour later to escape the heat, I saw the smoke from the fire on Loma Prieta, and then in the evening, the flames. Bad timing. An hour later I learned that both my son and my son-in-law were up fighting the blaze with their engine teams, and fortunately they have been more successful in containing the fire than the crews who have been battling the Soberanes blaze.

Five years ago, a colleague and I were contracted to prepare a Climate Change Vulnerability Assessment for the city of Santa Cruz. We started that report with quotes from three high profile leaders.

"The greenhouse effect has been detected, and its changing our climate now"- James Hansen, Chief of NASA's Goddard Institute for Space Studies during a U.S. Senate Hearing on global warming, 1998.

"We have to deal with greenhouse gases. From Shell's point of view, the debate is over. When 98 percent of scientists agree, who is Shell to say 'Let's debate the science'?" – John Hofmeister, President of Shell Oil Company in speech to National Press Club, 2006.

“There are three responses to climate change: mitigation, adaptation and suffering. We are already doing some of each. The only question is what the future mix will be. The more mitigation we do, the less adaptation and suffering we will have to do.” – Dr. John Holdren, Scientific Advisor to President Obama, 2009.

We presented several conclusions regarding the issues that were most likely to affect the Santa Cruz area in the decades ahead:

1. Sea-level rise. As sea level continues to rise, low-lying coastal areas will be subjected to more frequent flooding during major storms and high tides, and cliff erosion will be accelerated.
2. Temperatures will steadily increase with more extreme events, such as heat waves and droughts.
3. Wild land fires will increase.
4. Rainfall is likely to be even more concentrated in winter months, leading to more frequent or larger flood flows.

The first half of 2016 has erased historic temperature records. It is becoming increasingly likely that 2016 will surpass 2015 as the hottest year on record since we began monitoring temperatures on a global scale about 125 years ago.

The Earth has now experienced 14 consecutive record hot months. According to NASA scientists, 15 of the 16 hottest years since record keeping began have occurred since 2001. While it is difficult to take one hot day, one hot month, or even one very hot year and attribute it to global climate change, the trends are becoming increasingly clear.

It isn't just that the air is getting warmer, elevated ocean temperatures in the tropics have led to a record third year of a global coral bleaching event. This has hit Australia's Great Barrier Reef particularly hard, with 93% of the reef showing signs of bleaching. That increased heat is also melting ice and continuing to raise sea levels. Extreme weather events across the planet and ecosystem disruptions are becoming more frequent as well.

The debate is over, and California is taking some big steps to deal with these issues. For those who would argue that it will hurt the economy to make major changes in automobile fuel economy or our investment of renewable energy, it's

important to keep in mind that California has the most stringent environmental regulations in the nation, has the country's three largest solar farms, and now has the world's 6th largest economy. You never know what you are capable of doing until you try.