



**MEMORANDUM**

**TO:** California Ocean Protection Council  
**FROM:** Jennifer Phillips, Program Manager  
**DATE:** February 3, 2016  
**RE:** Update on Harmful Algal Bloom and Changing Ocean Conditions

**Harmful Algal Blooms and Changing Ocean Conditions**

2015 was a truly unprecedented year for the California Current System, and the harmful algal bloom (HAB) seen off the coast is similarly unprecedented in size, duration, and toxicity. The ‘Ridiculously Resilient Ridge’ of high pressure formed over the West Coast for the past couple of years diverted storms from California and extended our drought. It also caused the “blob” of warm water off the west coast which provided optimal conditions for this persistent HAB and thereby caused marine mammal deaths, crab fishery closures, and has impacted our marine resources. The HAB involves a phytoplankton which produces a toxin, domoic acid (DA), which can poison marine mammal and bird populations and cause Amnesic Shellfish Poisoning in humans. Many of our top fisheries could be at risk with changing ocean conditions and the persistence of DA (California spiny lobster, Dungeness crab, groundfish, anchovy, sardine, and mackerel.)

Dr. Raphael Kudela of UC-Santa Cruz will discuss some of these anomalies in the Pacific Ocean such as the “blob” and warming ocean conditions and their impact on HABs. Dr. Kudela will also discuss a model he developed to better predict HABs and their likely impacts on fisheries such as Dungeness and rock crab. This model and research allow state health regulators to close fisheries earlier and thus better protect human health. The predictive model was developed under OPC Prop 84 funds and has since received additional funding from the federal government.

More specifically, this project developed a real-time HAB forecasting system to inform when and where exactly toxic blooms are occurring to better inform management decisions. The model is currently hosted through the Central and Northern California Ocean Observing System (CeNCOOS) and is used routinely by shellfish growers, bird and mammal stranding groups, researchers, and members of the public. In the last six months of the project the group received funding from the NASA Ecological Forecasting Program to transition the model to NOAA. By the end of 2018, they anticipate having a fully operational model maintained at the federal level. OPC’s investment was crucial to the successful, initial development of a tool to help resource managers forecast and manage HABs on the West Coast.

Such efforts help California respond faster to DA outbreaks and take informed management and precautionary action depending on the model output.. This could greatly change how we do business. Dr. Kudela will elaborate on how this model helped managers take action faster and make smarter decisions up and down parts of the California coast this past summer and fall.

Work like this also tells us that we cannot address the next HAB in a vacuum. This is a dialogue about our changing ocean conditions and it is critical we continue to foster strong, interdisciplinary collaborations. We will continue to need better, faster, and cheaper tools that use the best available climate information to help make smart management decisions. Through the use of these tools, such as Dr. Kudela's model, we can reduce impacts and increase the resilience California's marine resources and the communities that depend on them. The OPC has invested in the science behind changing ocean conditions and will continue to make smart investments to address these challenges and develop solutions together.