Cécile E. Mioni[1], Raphael Kudela[2]*, Dolores Baxa[3], Wim Kimmerer[4], Tomofumi Kurobe[5], Hans Paerl[6], Alexander E. Parker[7]. *Presenting, 1: Ocean Sciences Department, University of California Santa Cruz, 1156 High Street, Santa Cruz, CA 95064; cmioni@ucsc.edu; 831-459-4098, 2: Ocean Sciences Department, University of California Santa Cruz, 1156 High Street, Santa Cruz, CA 95064; kudela@ucsc.edu; 831-459-3290; 831-459-4882 (FAX), 3: University of California, Davis, School of Veterinary Medicine, Department of Anatomy, Physiology, and Cell Biology, One Shields Avenue, Davis, CA 95616; dvbaxa@ucdavis.edu; (530)754-8020, 4: Romberg Tiburon Center, San Francisco State University, 3152 Paradise Drive, Tiburon CA 94920; kimmerer@sfsu.edu; (415) 338-3515. 5: University of California, Davis, One Shields Avenue, Davis, CA 95616; tkurobe@ucdavis.edu, 6: University of North Carolina at Chapel Hill. Institute of Marine Sciences, 3431 Arendell Street, Morehead City, NC 28557; hans_paerl@unc.edu; 252-726-6841, Ext. 133, 7: Romberg Tiburon Center, San Francisco State University, 3152 Paradise Drive, Tiburon CA 94920; aeparker@sfsu.edu; (415) 338-3746

Determining Environmental controls and ecological impacts of CyanoHABs in the San Joaquin-Sacramento Delta – A multidisciplinary approach

Abstract: Harmful cyanobacteria (CyanoHABs), and the toxins they produce are a growing concern as a source of impairment in California water bodies. The potential adverse impacts of the bloom-forming cyanobacteria on the San Francisco Estuary are large. Delta water is used to supply drinking water to 20 million Californians and irrigates 4.5 million acres of farmland. The estuary is habitat for fish, birds, and marine mammals, and contains many threatened and endangered fish, including several species exhibiting population level declines. Total cyanobacteria biomass has increased since 1975 throughout the San Joaquin-Sacramento Delta coincident with a decline in diatom biomass. Recurrence of seasonal CyanoHABs in the Delta since 2000 coincided with the decline of various pelagic organisms and their copepod prey, suggesting that these cyanoHABs may at least in part be responsible for this decline. The increase in CyanoHABs coincided with several environmental changes known to favor their growth including increasing water transparency and temperature. These environmental changes also appear to correlate with the decline of pelagic fish species. In 2011, we initiated a multidisciplinary, collaborative monitoring program in the Delta with the goal of gaining a more complete understanding of the environmental drivers controlling cyanoHAB occurrence and toxicity as well as impacts on the pelagic food web. Here, we present preliminary results from our seasonal monitoring of spatial and temporal distribution of cyanoHAB species and associated toxins throughout the Delta. Our results indicate that surface water temperature and nutrient availability, especially nitrogen sources, are key drivers of cyanoHAB composition and toxicity, but additional environmental stressors specific to individual cyanoHAB taxa may also play a significant role. In addition to *Microcystis*, other toxin-producing cyanobacteria such *Aphanizomenon*, may be significant contributors to bloom toxicity in the Delta. Furthermore, we find evidence for microbial interactions as mediators of toxin production within the cyanoHAB assemblage.

Statement of Relevance: Cyanobacterial blooms are an increasing threat globally, and have emerged as a serious issue in the San Joaquin-Sacramento Delta. Based on preliminary data from a multidisciplinary monitoring program, we identified surface water temperature and nutrient availability, especially nitrogen sources, as key drivers of cyanoHAB composition and toxicity.