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The Prevalence of Cyanotoxins in Southern California Waterbodies Based on Screening Assessments and Regional Monitoring Programs

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INTRODUCTION

Harmful cyanobacteria blooms (cyanoHABS) have gained national attention in recent years due to the global increase in frequency of blooms. CyanoHABS cause a large number of water quality issues such as impairment of recreational uses, reduced aesthetics, lower dissolved oxygen concentrations, and taste and odor problems in drinking water, however, the production of toxins (called cyanotoxins), is the most concerning. Cyanotoxins cause illness and mortality in humans, domestic pets, wildlife and livestock. As such, there is a growing recognition that water quality programs should include these biological contaminants and cyanotoxins should be considered in ecological and human health risk assessments (Chapman, 2015, Brooks et al., 2016). Cyanotoxins have been listed as the highest priority analytes for inclusion in ambient monitoring programs by both USGS and EPA. Heath advisory thresholds have also been developed by EPA for drinking water and by the State of California for recreational exposures. Despite the growing recognition of this risk, the extent and magnitude of cyanoHABs and cyanotoxin prevalence is poorly characterized in California, particularly in the heavily populated area of Southern California. The purpose of this report is to summarize the prevalence and extent of cyanotoxins, and in some areas, cyanobacteria, across a wide variety of aquatic habitats. The report consists of three main chapters: Chapter 1 provides an introduction and background on cyanoHABs; Chapter 2 summarizes the wadeable streams statewide assessment for cyanobacteria taxa and cyanotoxins; and Chapter 3 focues on the extent of cyanotoxins in lentic waterbodies in Southern California, and several intensive studies conducted in San Diego.

All of the sites surveyed for cyanotoxins are shown in Figure 1. Microcystins, one type of cyanotoxin, were detectable and present in all of the waterbody types surveyed and across all land use types. Where possible, the toxin concentrations were color-coded to visualize if they were above or below the California recreational health advisory thresholds (0.8 μg L^{-1}, OEHHA 2012). Samples types for which there is no applicable health advisory threshold are shown in yellow and comprise wadeable stream samples of benthic algae and passive sampling devices (Solid Phase Adsorption Toxin Tracking, SPATT). SPATT was used as a screening assessment tool that provided insight into the overall cyanotoxin prevalence in the waterbodies.

Full text:
http://ftp.sccwrp.org/pub/download/DOCUMENTS/TechnicalReports/930_CyanotoxinsInSouthernCaliforniaWaterbodies.pdf