**Improving tools for monitoring multiple HAB toxins at the land-Sea Interface in Coastal California (HAB-SICC)**

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**Introduction of the problem:** The conventional focus of HAB monitoring has generally been water body-dependent, focusing on marine or freshwater toxins, but not both. Freshwater HAB toxins have previously been considered a public health issue only for fresh water, but recent studies have shown that cyanobacterial toxins have effects reaching far downstream, creating issues in brackish and marine waters. The mortality of over 30 endangered sea otters in Monterey Bay from microcystins (MCY) in contaminated marine bivalves (Miller et al. 2010) exemplify the threat these toxins pose in marine ecosystems. MCY contamination has been reported from marine waters of the Klamath and San Francisco estuaries and Rodeo Lagoon (Lehman et al. 2005, Fetcho 2007, Drake et al., 2010), from river inputs to Monterey Bay (Miller et al. 2010, Gibble and Kudela, 2014), coastal lagoons and estuaries in San Diego (Howard and Busse, unpublished data) and many California streams (Fetcher and Howard, unpublished data). Other cyanotoxins (saxitoxin, cylindrospermopsin, anatoxin-a) have been detected in fresh waterbodies in California that connect to the coastal ocean, but are not routinely screened in marine outflows.
**Rationale:** There is widespread interest within the California management community in using monitoring tools such as passive samplers (Solid Phase Adsorption Toxin Tracking, SPATT), to augment routine HAB monitoring programs. A necessary first step is to improve and vet these tools, field-test, and demonstrate their management application for routine monitoring programs. This will enhance current HAB monitoring in California, provide a coordinated regional monitoring and event response strategy that can be implemented on a statewide basis, and will provide a much needed survey of toxins and toxigenic organisms at the land-sea interface.
**Objectives:** The objectives are to (1) determine the predominance and extent of both marine and freshwater HAB species and toxins present at the land-sea interface, (2) demonstrate/validate how SPATT can be incorporated into existing monitoring programs as a time-integrated, cost effective approach, (3) facilitate the incorporation of an integrated HAB monitoring strategy at the land-sea interface into existing HAB and water quality monitoring programs
**Summary of Work:** The proposed project builds on previous work in Monterey Bay that developed and demonstrated the use of SPATT samplers for domoic acid, okadaic acid, and MCY monitoring at the land/sea interface. We will (1) conduct a field survey to determine the relevant HAB species and toxins, establish cultures of putative toxin-producing species, using a variety of strategies and methodologies (including mouse bioassays) to establish the presence of freshwater cyanotoxins along the CA coast, (2) validate and field-test SPATT technology using information from the field survey and cultured HABs, (3) improve the monitoring technology of SPATT for incorporation into routine monitoring programs, (4) implement an integrated multi-toxin HAB strategy at the land-sea interface and transition SPATT technology to end-users and management agencies. The proposed project will facilitate implementation of an integrated monitoring strategy by relevant groups through a targeted interactive webinar focused on augmentation of existing monitoring efforts with SPATT and with improved knowledge of the toxins and toxigenic species present at the land-sea interface.