Investigating Water Quality Problems Created By Cyanobacterial Blooms in CA: An Overview of State Water Board Activities 2006-2012

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November 28, 2012

Fall 2005: State Water Board Workshop on Record-Setting Toxigenic Blooms on Klamath River Reservoirs

- USEPA, SWRCB, and RWQCB Coordination & Information-Sharing With Tribal Representatives, Local Agencies, And Other Interested Parties
- High Levels of Persistent & Bioaccumulative Microcystin Toxins Produced By Reservoir Blooms Noted During 2005
- Outcomes Included Establishment of Statewide “BGA” Working Group (2006 Through Present)

Statewide Bluegreen Algae Workgroup: Draft Voluntary "BGA" Guidance Manual

- Draft Guidance Initially Developed By Statewide "BGA" Work Group in 2006, Including SWRCB, USEPA, and CDPH
  - Periodic Revisions Since 2006
- Contains Guidance For Recreational Water Monitoring, Reporting, and Hazard Communication
- Incorporates Aspects of 1999 WHO Guidance Document

Draft Voluntary "BGA" Guidance Manual cont'd

- Provides Decision Flowchart
  - ≥40,000 cells *Microcystis* and *Planktothrix* per ml triggers posting
  - ≥ 8 ppb microcystin (or detection of anatoxin-a) triggers posting

- Current Draft (2010)
  - Online at: http://www.cdph.ca.gov/HealthInfo/environhealth/water/Documents/BGA/BGAdraftvoluntarystatewideguidance-07-09-2010.pdf
  - Currently subject to revision

March 8, 2006 SWRCB Board Resolution No. 2006-0016

- General Finding: Toxigenic Blooms Pose Significant Environmental Health Risk to Humans, Pets, Livestock, and Wildlife

- Cleanup & Abatement Account Monies Appropriated To Investigate the Magnitude & Extent of This Water Quality Problem in California

State Water Board Training Academy Workshops

- June 13, 2007 “Understanding Algal Blooms”
  - General training on harmful algal blooms, including marine HABs and bluegreen algae
  - Included training on and distribution of Envirologix ELISA test kits

- June 1-2, 2009 “Cyanobacteria Harmful Algae Blooms and Water Quality”
  - Instructor Wayne Carmichael
  - Intensive training on bluegreen algae, including laboratory identifications of BGA genera

State Water Board Funded Projects

- Some Funding for Support of Pre-Existing Water Quality Investigations, e.g. On-Going Work on Klamath River Reservoirs by the Karuk Tribal Government

- Contract With OEHHA To Develop Recommended "Action Levels" As Exposure Thresholds For Humans, Dogs, and Cattle For Some Microcystins and Other Cyanotoxins

  - Peer Review and Final Report available at http://www.waterboards.ca.gov/water_issues/programs/peer_review/peer_review_cyanotoxins.shtml

State Water Board Funded Projects cont'd

Peer-Reviewed OEHHA Recommended "Action Levels" For Protecting Human/Animal Health From The Following Cyanotoxin Exposures (May, 2012)

"AL's" Developed Cylindrospermopsin, Anatoxin-a, & 3 Congeners of Microcystin In The Following Exposure Scenarios:

- Human swimming action level of 0.8 µg/L microcystin in water
- Also provided levels for
  - Human consumption of sport fish and shellfish
  - Dog & Cattle ingestion from natural/impounded waters
  - Dog & Cattle consumption of cyanobacterial crusts or mats
- ***Did not*** *estimate exposure through drinking water for humans*

State Water Board Funded Projects cont'd

- DFG Water Pollution Control Laboratory Contract for development of LC-MS/MS methods for analysis of microcystins & other cyanotoxins, plus "ad hoc" sample analysis for public agencies/CA university researchers
  - Includes Support for Analytical Work on "Threatened" California Sea Otter Microcystin Poisoning Cases
- Contract With UC Santa Cruz to Support DFG Investigation, Conduct Environmental Investigation of Potential Upstream Freshwater Sources of Microcystins Implicated in Otter Poisoning Cases near Monterey Bay Watersheds

General Findings From the Monterey Bay Area Watershed Investigations

- Microcystins Are Generated Upstream & Transported To Coastal Waters During Seasonal River Flows
- Microcystins Can Persist Under Ambient Environmental Conditions Long Enough To Enter Food Web
- Primary Sea Otter Invertebrate Prey Species Can Bioaccumulate Microcystins, & Are Slow To Depurate: Mussel Depuration Was Particularly Slow
- Microcystin Poisoning Via Ingestion Accounted For 21 Confirmed Sea Otter Mortalities (As of 2010)

Recent Funding - Pinto Lake

- NPS Planning Project for Pinto Lake : Grant #10-443-553-0/ City of Watsonville
  - Microcystin sampling in Pinto Lake
  - nutrient sampling/analysis in Pinto Lake
  - nutrient sampling/analysis in Pinto Creek
  - Measurements of the pH & dissolved oxygen in both Pinto Lake and Pinto Creek
  - Installation of two monitoring wells adjacent to Pinto Lake

- As of April 20, 2012, 80-100% of work completed

Recent Funding - Pinto Lake cont'd

- Pinto Lake Pilot Implementation Project (2011-13)
- SWRCB Grantee: City of Watsonville – Subcontractors Include CSUMB
- Microcystin Production in Several Taxa Occurs Year-Round, With Peak Concentrations in Late Summer/Fall
- Purpose: To Evaluate Performance of Treatment Methods Used in Conventional Sanitary Engineering For Sewage in Treating Contaminated Lake Water
- Sand Bed Filtration, Flocculation, Ozonation
- Current Status: On-Going Difficulties With Sand Filter Clogging
  - October 2012 Microcystin Concentrations up to 5,000 X WHO Guidelines For Drinking Water

Questions?