California Cyanobacteria Harmful Algal Bloom Network

August 14, 2024, 9:00 am to 12:00 pm

Virtual Meeting

Agenda (With Minutes)

Join Zoom Meeting

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Meeting ID: 837 2393 1859 / Passcode: 837273

Dial by your location: +1 669 900 6833 US (San Jose)

9:00 am **Welcome, Introductions, Announcements, etc. (5)**
Presentation begins at 0:00 of meeting RECORDING

9:05 am ***The next decade of Harmful Algal Blooms in the US*, Holly Bowers, San Jose State University and National HABs Committee co-Chair (20)**
Presentation begins at 1:00 of meeting RECORDING

Harness 2024-2034:

- Thematic Groups
  - Observing Systems and Modeling, detection and ecological impacts, human dimensions of HABs, and HAB management. Through these groups, current understanding/advances, knowledge gaps/opportunities, and future recommendations/paths forward were kept in mind.
- Stakeholder Groups
  - Policy makers, public, regulators/managers, research community, health sector, and industry
- Common Priorities
  - Infrastructure for various forms of data and reference material curation and storage, integration and standardizing of methods across freshwater and marine water bodies, further determination of regulatory concentration thresholds for cells/toxins, support for long-term (years), spatially data series, efforts to address multiple co-occurring HABs, evaluation of HAB issues in the context of other stressors, most notably the accelerated changes in climate projected in the next decade, increased partnerships and coordination to fulfill these multifaceted efforts, and address the interactive effects of natural, human-derived and climate drivers of HABs in the context of management.
- Chapter 1: Observing Systems, Modeling, Forecasting
  - Advancements: portable detection platforms, satellite-based sensors and community science contributions for monitoring

    - Knowledge Gaps: Operations and maintenance costs and Ground-truthing of remote sensing algorithms to species/toxins
    - Paths Forward: Expand, develop and validate new and improved tech for cell/toxin detection, improve coordination and use of networking technologies (NHABON), sustained time series measurements, and develop food web models (fate/effects of toxins)
- Chapter 2: Detection and Ecological Impacts
    - Advancements: Increased databases and assays for species, genes, and toxins, toxins in the food web, and freshwater to marine continuum.
    - Knowledge Gaps: Toxin synthesis pathways (more congeners), metabolomics/proteomics, and acute/long term toxin exposures
    - Paths Forward: reference materials and biomarkers, biotic and abiotic sinks for toxins, acute and chronic impacts on life stages, multivariate studies, and role of bacteria and viruses in the bloom cycle
- Chapter 4: Human Health Dimensions
    - Advancements: Guidance/regulations for toxins in drinking and recreational waters, National Outbreak Reporting System; One Health Algal Bloom System
    - Knowledge Gaps: Acute and chronic exposure effects, Differences in vulnerability to toxin exposure, Information dissemination
    - Paths Forward: Epidemiological studies, Repository for human/animal specimens, cross-disciplinary networks, economic/social/cultural impacts.

9:25 am **Freshwater Harmful Algal Bloom (FHAB) Program Updates/Regional Updates**

- ***Summer Regional Updates*, Regional HAB Coordinators/Monitoring Entities, Regional Water Boards (50)**

Presentation begins at 22:00 of meeting RECORDING

Statewide Update:

- Regional Board HAB Coordinators:
    - About 1 staff per region
- Resources at CA FHABs Portal = https://mywaterquality.ca.gov/habs
- On the last pre-holiday assessment of 2024 (Labor Day)
- Assessment approaches for FHAB in Inland Waters using Satellite Remote Sensing:
    - Goals of this report are to develop and document standardized protocols for processing remotely sensed imagery with supporting open-source data processing code, articulate quality assurance and control criteria for these data, identifying and document data calculations and metrics addressing priority management questions, create key visualizations using these data and metrics suitable for reporting with supporting open-source code, and identify key gaps in existing products and make strategic recommendations towards filling these gaps

Region 1 Update (North Coast):

- Routine Monitoring
    - Klamath Basin: Biweekly microcystins monitoring
    - Big Lagoon: Biweekly microcystins monitoring
    - Russian River: Biweekly cyanobacteria ID
- Benthic Monitoring Recommendations:
    - Tiered Approach: Deploying SPATTs as sentinel samplers for cyanotoxins, visual assessments for cyanobacteria percent cover, and benthic mat collections to confirm bloom toxicity
    - CCHAB Benthic Subcommittee: RB1 drafted tech memo on 2022-2023 pilot studies evaluating the tiered approach and drafted tech memo to support use of precent cover and SPATT thresholds.
- Other Research:
    - USEPA ROAR Project (2nd Year): Project goal is to develop standardized benthic sampling methods. This year RB1 will focus on how many SPATTs are needed to characterize benthic algal blooms in rivers.
    - University of Nevada Reno: Spatial variation in anatoxin production within and across river networks in California and influence of river/watershed factors.
- 2024 Partner Trainings
    - RB1 hosted a series of trainings: 4 Total

Region 2 Update (San Fransisco Bay):

- 2024 Incidents
    - San Fransisco Bay: discoloration that dissipated. No reported fish kills
    - Lake Merced (SF): recurring HABs bit late notification from agency
    - A few fish deaths in lakes/ponds but not HABs related
    - Lake Hennessey HAB
    - EBRPD weekly monitoring
- Pre-Holiday Assessments: no advisories so far
    - SWAMP team monitoring: Crissy Field Marsh, Marina Lagoon beach, Mountain View Shoreline Lake
    - Holiday partner monitoring: Napa Institute for Conservation Advocacy Research and Education (3 popular swimming locations) and Sonoma Ecology Center (2 popular swimming locations)
- Partner Monitoring: Rotary Nature Center at Lake Merritt
    - monthly sampling (May-October) at 2 locations
    - Weekly DO readings with SWAMP sonde
    - Incident response as needed
- SF Bay HAB Coordination Group
    - Updated SF Bay HAB response document (R2, State Board, CDFW, OEGGA, CDPH, SFEI, USGS, Bay Keeper, and community scientists)
    - 2024 pre-bloom kick off meeting
    - Side note: Rebecca Nordenholt is no longer the co-Region 2 HABs coordinator, but will remain SF Bay HABs coordinator in 2024

Region 3 Update (Central Coast):

- Plans for Labor Day Pre-Holiday Assessment at 10 waterbodies (That are also monitored by CCAMP and SWAMP ambient monitoring program)
- Cautions advisories:
    - San Antonio for Pre-Memorial Day and Pre-Independence Day
    - Lopez for Pre-Independence Day
    - Oso Flaco for Pre-Memorial Day and Pre-Independence Day

Region 4 Update:

- Partners from LA County and City of LA participated in pre-holiday assessment for pre-4th of July. Caution advisory was recommended for Puddingstone Reservoir and Legg Lake. No advisory recommended for Machado Lake

Region 5 Update (Central Valley):

- Restore the Delta Partner Monitoring (RTD)
    - Sampling of 7 sites along the Stockton Waterfront and San Joaquin River conducted by RTD
    - Weekly microcystin strip tests
    - Monthly microcystin (MC) ELISA
- Tulare County Partner Monitoring
    - Water grabs and SPATT every two weeks, benthic mats if present, at 4 sites
- Pre-Holiday Results:
    - Hensley Lake had a caution for Memorial Day and 4th of July
    - Eastman Lake had a caution for Memorial Day and a warning for the 4th of July
    - Clear Lake had a danger on the 4th of July
- R5 Advisories:
    - Dangers consisted of 18 advisories at 7 waterbodies
    - Warnings consisted of 5 advisories at 3 waterbodies
    - Cautions consisted of 12 advisories at 10 waterbodies
    - Algal Mat Alerts consisted of 2 advisories at 2 waterbodies
- Discovery Bat Event Response
    - Multiple reports from the public to the Water Board Bloom Report Form (IWG has 8 cases in progress for human illness/fish death
    - Sampled by Water Board 6/28/24 and 7/25/24 (13 samples total)
    - MC in all samples
    - ATX in 3 samples

Region 6 Update:

- Monitoring updates:
    - Labor Day pre-holiday assessment: approximately 25 waterbodies are monitored with coordination with about 15 partners
    - Benthic Monitoring Special Study: Benthic HABs have been observed in the Little Truckee River during every event so far. Benthic HABs have not been seen in Big Meadow Creek but observed some in the upper Truckee River about 5 miles downstream of the Big Meadow Creek Monitoring location, so the sample site has now been moved to the Upper Truckee River.
    - Partner monitoring: continuing partner monitoring program with Inyo County Environmental Health. Inyo County Environmental Health monitors Diaz Lake,

Millpond, and Pleasant Valley Reservoir conducting monthly monitoring while weather allows.

- HAB Reports Updates:
  - Advisories this season: 2 warning advisories in Tahoe Keys Lagoon and Silverwood Lake. 11 cautionary advisories recommended so far at Lake Tahoe, Red Lake, Lake Gregory, Indian Creek Reservoir, Eagle Lake, Tinemaha Reservoir, Apollo Lake, Upper Truckee River, Diaz Lake, Bridgeport Reservoir, and Crowly Lake. 1 Algal alert in the Litter Truckee River
  - Active Illness Investigations: 2 dog deaths, 1 fish kill, and 6 human illness cases

Region 7 Update:

- Wiest Lake had a caution advisory last month. Caution recommended for a small area at south of Salton Sea. RB7 coordinating with USEPA and Arizona in developing a bi-state HAB monitoring program.

Region 8 Update (Santa Ana):

- FHAB Bloom Reports and Incident Response:
  - Big Bear Lake, San Bernardino County (Bloom and Fish Death)
  - Lake Evans/Fairmond Lake, Riverside County (Bloom and Bird Death)
  - Cottonwood Lake/Reflection Lake, Riverside County (Bloom and bird death)
  - Lake Perris, Riverside County (Bloom)
  - North Fork San Jacinto River (Algal mat)
  - Mill Creek, San Bernardino County (Algal mat)
  - Mystic Lake, Riverside County (Bloom)
  - San Jacinto Wildlife Area, Riverside County (Bloom)
  - Lake Elsinore, Riverside County (Bloom)
- Monitoring and Assessment for Pre-Holiday sampling events (Memorial Day, July 4th, and Labor Day)
  - Big Bear Lake, Lake Elsinore, Lake Hemet, Mill Creek, Lytle Creek
- FHAB Partner Monitoring:
  - CA Department of Water Resources (DWR), CA Department of Fish and Wildlife, San Diego Zoo Wildlife Alliance, San Bernardino County, City of Lake Elsinore, Canyon Lake Property Owners Association and Elsinore Valley MWD, and City of Riverside

Region 9 Update (San Diego):

- FHAB Monitoring
  - Incident response/Satellite Notifications: 4 required follow-up actions
  - Pre-holiday assessment: 5 sites (Cedar Creek Falls, San Luis Rey River mouth, Guajome Lake, Lindo Lake and Spring Pond (Viejas)
  - Special Study: 4 out of 14 small public lakes and ponds sampled so far, next sampling dates are 8/26 and 8/28
- Current Blooms
  - Lindo Lake: Caution level
  - Libby Lake: Caution level
  - Santee Lake #7: Warning level
  - Heritage Park Pond: Warning level

- Morena Reservoir: Caution level
- Diamond Valley Lake: Caution level

DWR:

- For the LA region, there are two water bodies with caution advisories: Castaic Lake and Pyramid Lake.
- In Region 5 there are two water bodies with caution currently: O'Neall Forebay and St. Louis Reservoir.

10:15 am CCHAB Updates

- **Benthic Workgroup Update (5)**
- **Mitigation Workgroup Update (5)**
- **Illness Workgroup Update (5)**
- **Co-Chair Nomination Results & CCHAB Community Survey Results, CCHAB Co-Chairs (20)**

Presentation begins at 1:17:10 of meeting RECORDING

Benthic Updates:

- Evaluating recent science and considering revisions to benthic guidelines
- Reconvened May 2023 and paused for summer break
- Continued meeting in October 2023 and monthly meetings occurred through June 2024
- Overarching guidance question: should human use or domestic animal use be restricted in a waterbody due to the presence of benthic HABs?
- Expanded goals of the benthic guidance to provide processes for immediate event response, follow up monitoring, and routine monitoring.
- Conducted literature reviews for latest science and existing field protocols. Continuing to evaluate indicators and metrics of a potential new monitoring protocol.
- List of indicators being considered: coverage, cyanobacteria, toxins
- Envisioning a "grab bag" approach to the guidance
- Overview of the list of indicators being considered in guidance:
  - Coverage: percent cyanobacterial cover and cyanobacterial presence/absence
  - Cyanobacteria: DNA, Macroscopy, and microscopy
  - Toxins: qPCR, ELISA/LCMS (toxins in mat material), and SPATTs (time integrated measure)
- Benth Subcommittee Draft Products
  - Guidance technical report
  - Standard operating procedures for benthic sampling
  - Field data sheet
  - Supporting North Coast Regional Board percent coverage thresholds memo
  - Proposed signage options

Mitigation Workgroup

- Pinto Lake: bimonthly sampling
  - Had two large blooms
  - Currently the lake is closed with about 20 ppd of microcystin toxins present.

Illness Workgroup:

- Through July and August, we have had more than 40 case reports with potential illnesses that span from humans to dogs to fish.

Co-Chair Nomination Results:

- Karen Odkins: 1 more year
- Jayme Smith: 2 more years
- Sarah Ryan: 2 more years

10:50 am **Break (10)**

11:00 am ***The Current State of Cyanotoxin Public Health Engagement: A overview of Sacramento-San Joaquin Delta Response to HABs*, Spencer Fern, Restore the Delta (30)**

Presentation begins at 1:49:07 of meeting RECORDING

Restore the Delta

- Disadvantaged communities suffer from lack of public information on HABs
  - Disadvantaged communities: communities suffering a combination of economic, health, and environmental burdens.
  - Disadvantaged front-line communities are most affected due to lack of finding and monitoring for HAB threats
  - Lack of monitoring then leads to insufficient public information on HABs (no monitoring = no public health engagement)
- Collecting HAB data in the Delta
  - Restore the Delta has been monitoring HABs in the Delta in partnership with the SWB
  - Measures for the cyanotoxin *Microcystis* (using Abraxis Strip Tests as a initial indicator and using Bend Genetics for genetic testing)
- Limitations of current signage for public health response
  - Signage can only be posted if permission of the landowner is obtained: City-owned is much easier to contact and work with compared to privately owned.
  - Location of signage also varies by location: Sometimes in visible spots and then out-of-sight in other areas.
  - There is a lack of enforcement, which keeps public health agencies out of the response.
  - Signage translation can be lacking for communities.
- The importance of an informed community:
  - An informed community is a strong community
  - Understanding the public health risks of HABs that affect the community will help people recreate safely (helps people to advocate for changes in water policy)

    - Critical need for accessible and digestible public information sharing regarding environmental issues in every community.
- The Importance of Education Recreators, Particularly Youth
    - Informing the public needs to start with educating the youth
    - Main goal is to get HAB material into lesson plans for schools in Delta communities
    - End goal is to increase public awareness that can lead to enforceable standards that we currently struggle with in the Delta
- Lack of Public Health Considerations for HABs Leads to:
    - Lack of safe access to water to enjoy all beneficial uses
    - Unhealthy relationships between the community and the Delta as a resource
    - Disinterest or apathy to current public health implications due to continued disinvestment
- Where can we improve on Public Health and Response:
    - Public health agencies and government bodies need collaboration to address the threats to the community
    - Standards for HABs to make public notice enforceable
    - Making sure that updates and response forces are equitable throughout the Delta

11:30 am ***Forecasting Freshwater Cyanobacterial Harmful Algal Blooms for Sentinel-3 Satellite Resolved U.S. Lakes and Reservoirs*****, Blake Schaeffer, U.S. EPA Office of Research and Development (30)**

Presentation begins at 2:10:42 of meeting RECORDING

Forecasting Freshwater Cyanobacterial HABs for Sentinel-3 satellite resolved US Lakes

- Outline:
    - Motivation: knowledge of the timing and location of cyanoHAB events. No quantitative tool exists to forecast cyanoHABs.
- Forecasting:
    - Accuracy had a 0.90 prediction dataset
    - Sensitivity had a 0.88 prediction dataset
    - Specificity had a 0.91 prediction dataset
    - False Omission had a 0.01 prediction dataset
    - Precision had a 0.49 prediction dataset
- Model inaccuracies:
    - False positives: a bloom was forecasted, no bloom occurred
        - Concern: costs associated with additional monitoring
    - False negatives: no bloom was forecasted, a bloom occurred
        - Concern: Environmental, human, and animal health impacts associated with not issuing an advisory.
- Short blooms: concentration
    - Missed events were the largest source of false negatives.

- Key take-aways:
    - False negatives are predominately short-term, 1-3 week events occurring outside of the main recreation window (fall and winter)
        - Late season bloom forecasting may improve as the model trains on more data; however, it currently remains a potential blind spot in the model.
    - 57% of short-term FN events are missed events, other models may be better suited to capture short-term blooms
        - This may indicate the lower temporal forecasting limit of the model as the model inputs are weekly averages. This may improve if the model is trained on daily data.

12:00 pm **Adjourn**

Presentation ends at 2:42:04 if meeting RECORDING