State of the San Francisco Estuary
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Delta Harmful Algal Bloom Strategy: Where are We Going Next?

Ellen P. Preece[1], Mine Berg[2], Tricia Lee[3]
[1]Department of Water Resources [2]Environmental Science Associates;[3] Delta Stewardship Council; [4]California Department of Fish and Wildlife

Photo Cred: Janis Cooke

Development and Implementation of Coordinated HAB monitoring

1. Delta Cyanobacteria Harmful Algal Bloom Monitoring Strategy

2. Monitoring and Event Response (NOAA MERHAB) Project

Presentation focused on two collaborative projects. Information on how they are linked will be provided.

The Sacramento-San Joaquin Delta, CA

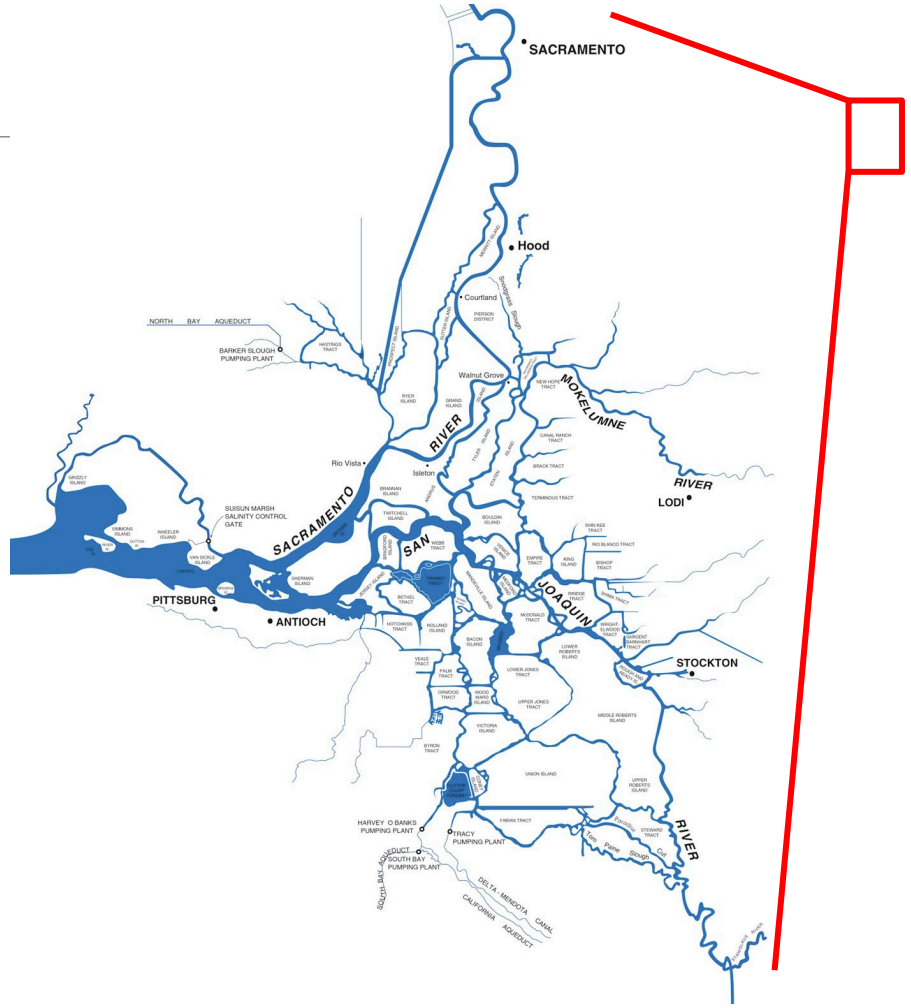
California relies on the Delta in many ways:

It supplies a portion of the drinking water for 27 million Californians

It fuels California's $3 trillion economy

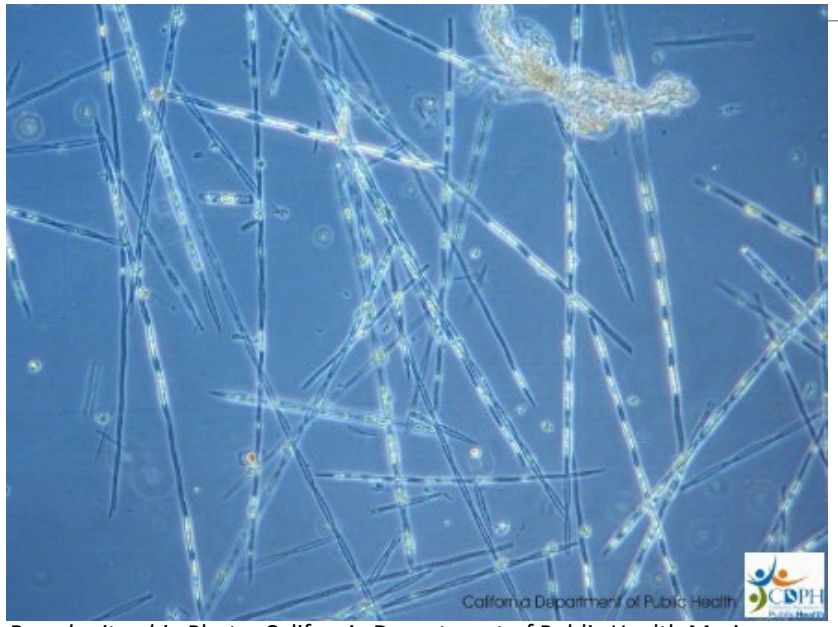
It is a biodiversity hotspot for more than 750 plant and animal species

It is home to more than 627,000 people spread across rural agricultural communities, legacy communities, and urban areas



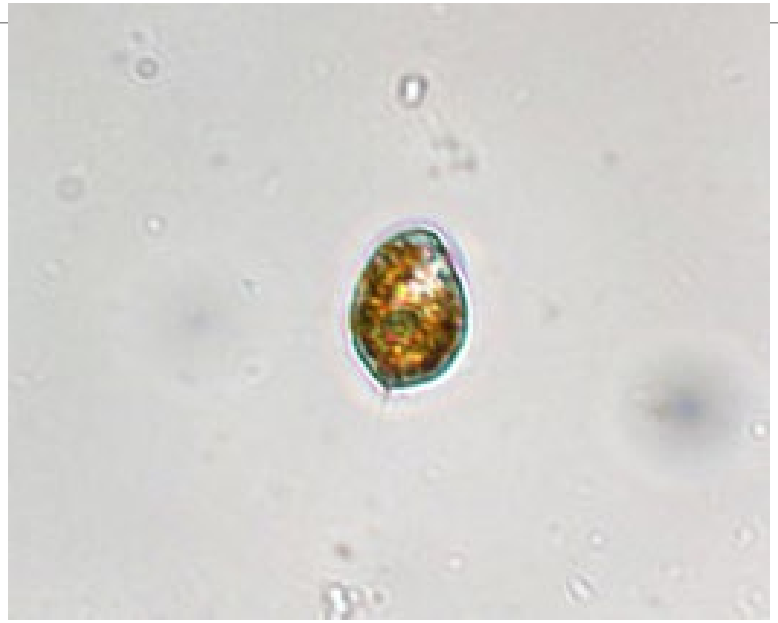
The Delta is an ecologically important body of water that is also a critical water source to millions of people

Coastal HABs



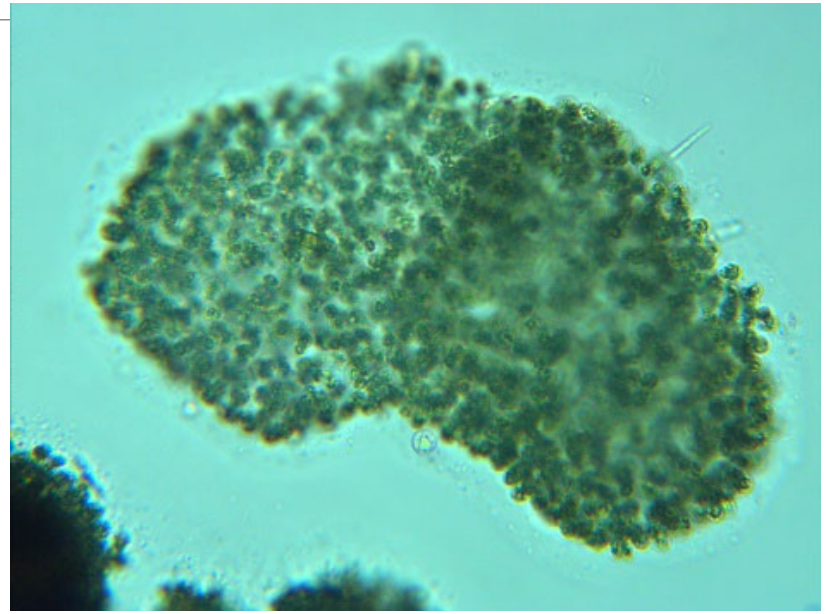
*Pseudonitzschia.*Photo: California Department of Public Health Marine Biotoxin Monitoring Program

Bay HABs



Heterosigma akashiwo. Photo: Kudela lab, UC Santa Cruz

Delta HABs

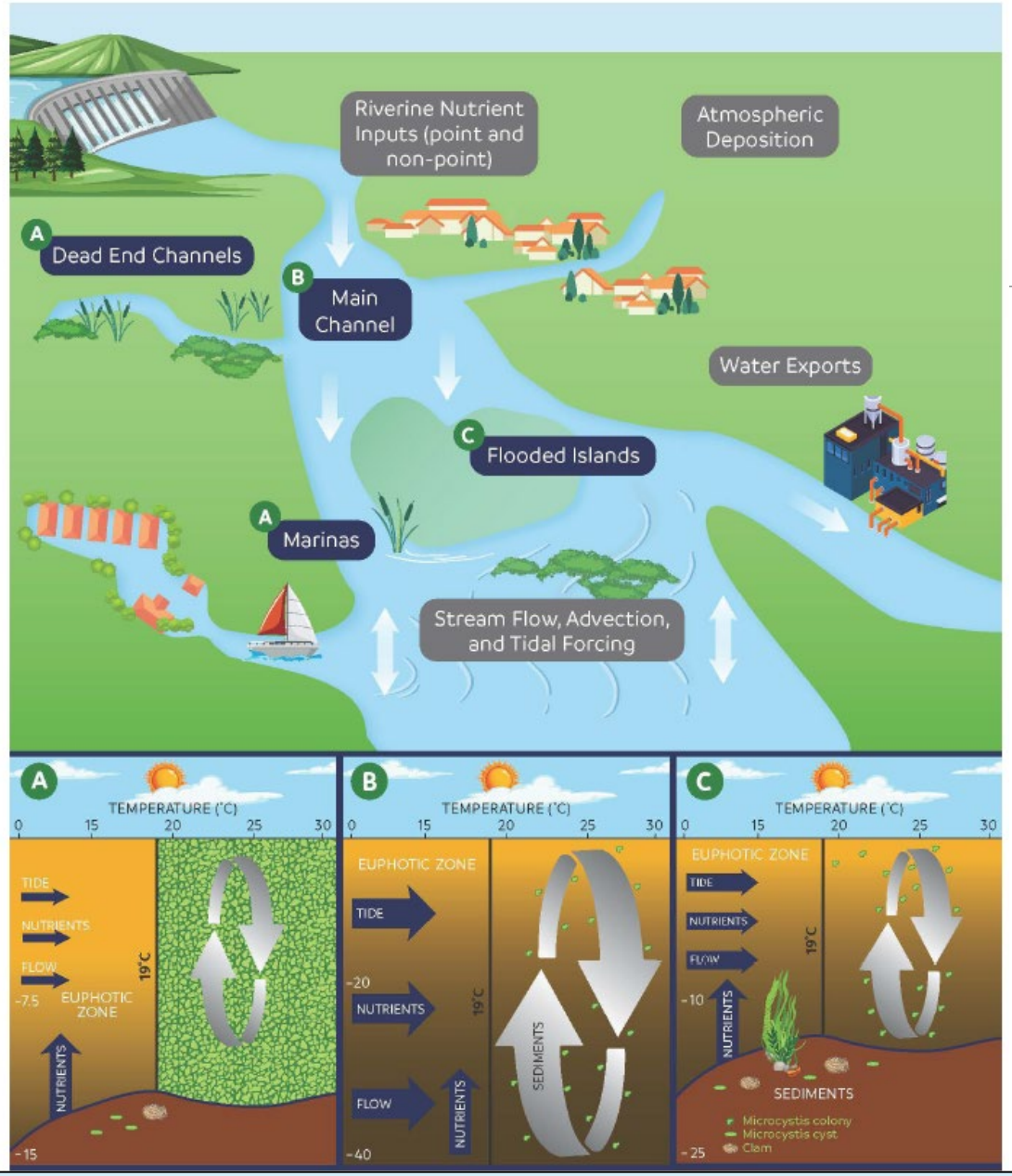


Microcystis colony. Photo: Janis Cooke, Central Valley Regional Water Board

Salinity

Harmful algal bloom taxa differ based on the salinity gradient

Conceptual Model



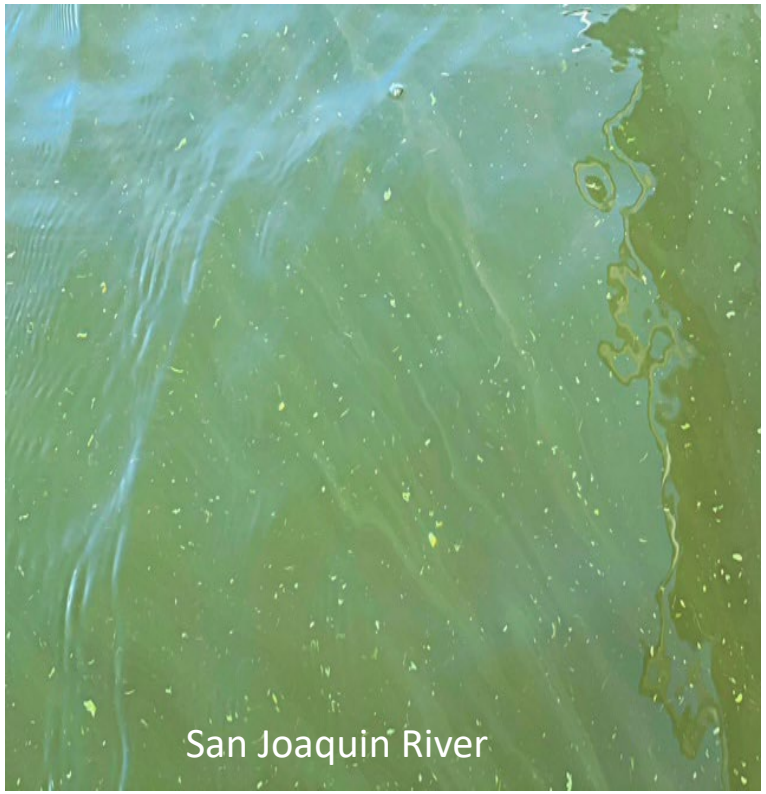
Shows how CHABs can form in different parts of the Delta

The Delta has many different types of habitats for cyanobacteria. The ability for cyanobacteria to form blooms is influenced by these habitat characteristics.

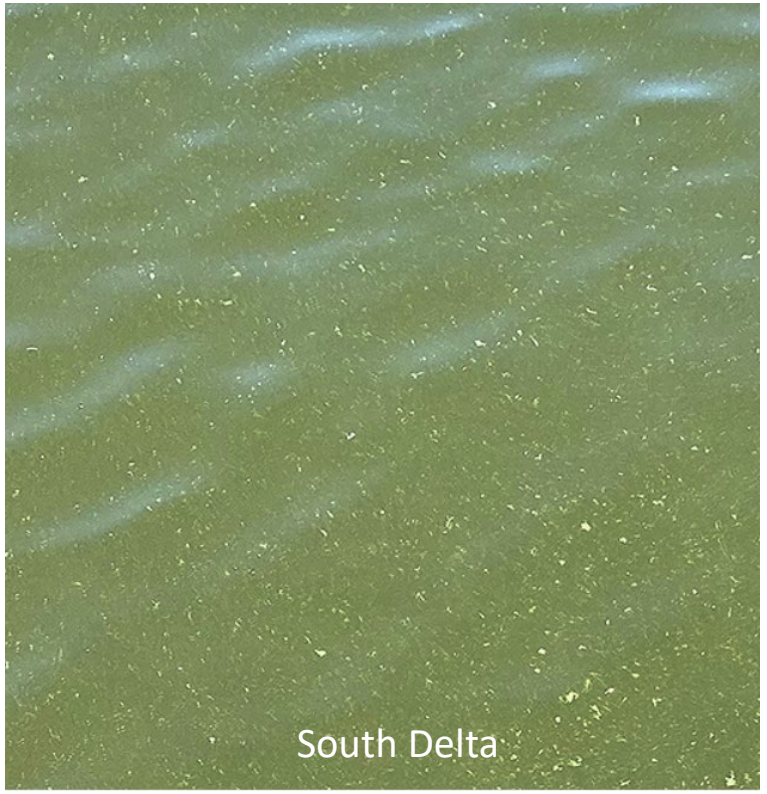
Microcystis in different Delta habitats

A. Dense

B. Sparse



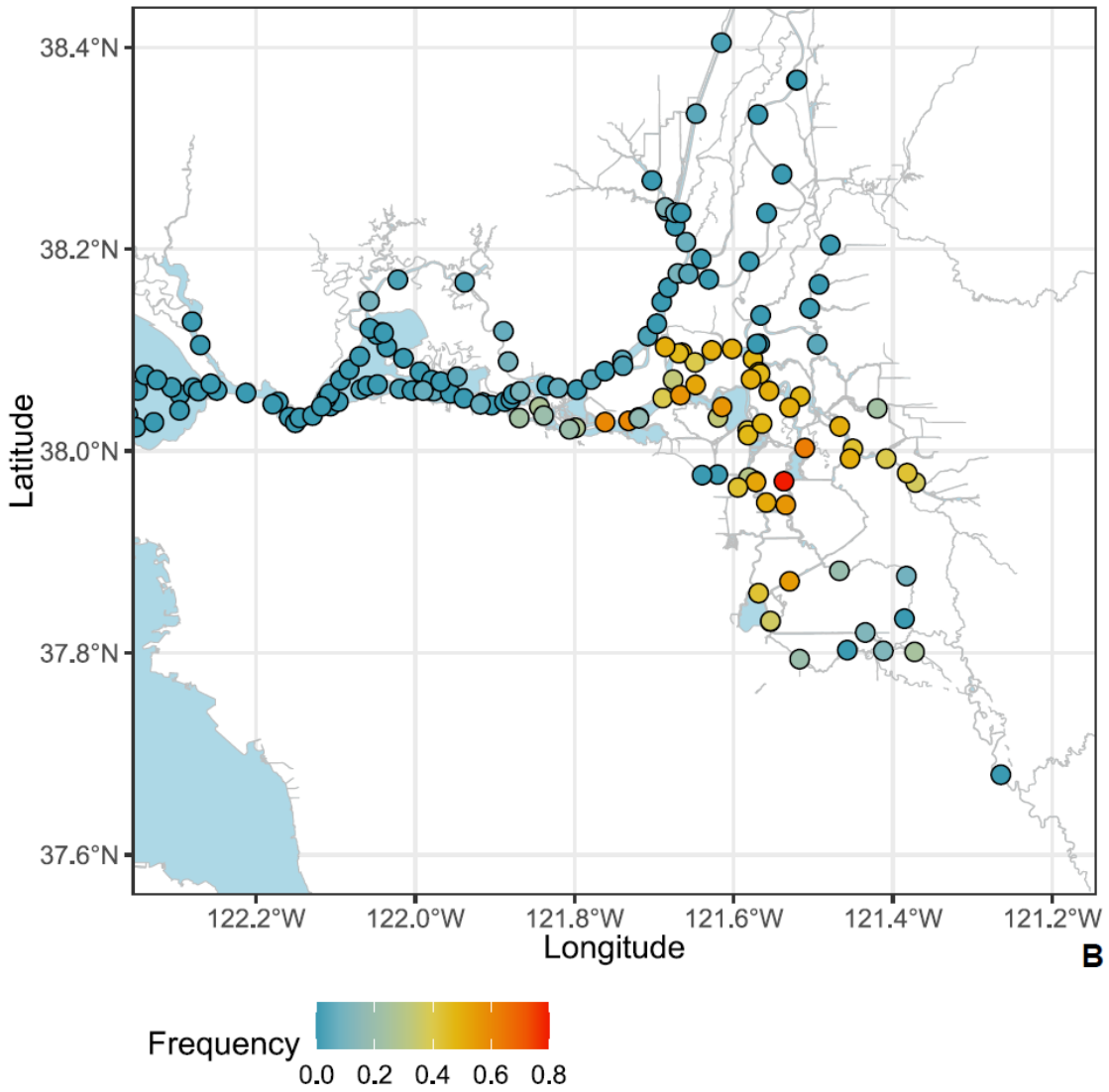
C. Intermediate



Microcystis cells present differently in different Delta habitats

Microcystis Visual Index (MVI) Data

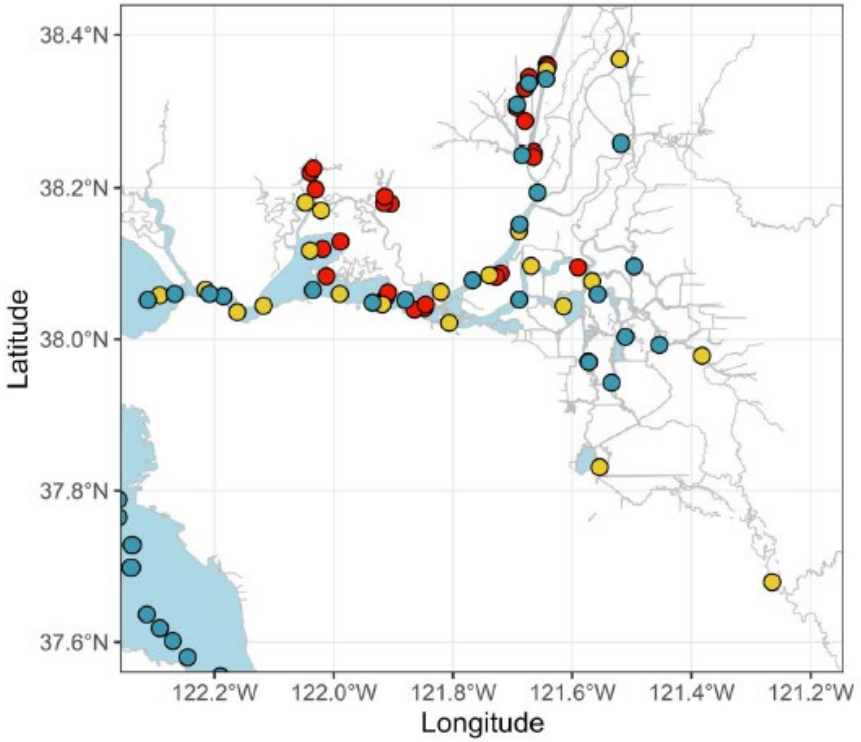
Frequency of occurrence of MVI levels 3+4+5, for the summer season (June–September) and recent time period (years 2017–2022)



Microcystis visual index data shows Microcystis is common in the central and southern Delta.

Need for Delta Cyanobacterial HABs Monitoring Strategy

- Current Delta HAB monitoring is not adequately coordinated
- Important variables are understood, including nutrients, temperature, residence time
- However, we lack detailed information about HAB status and trends and drivers
- This knowledge is needed to forecast, manage, and mitigate HABs



Map of phytoplankton measurement locations at which samples were collected for taxonomic analysis and biovolume measurement.

Programs are collecting CHAB related data, but there is no coordination among agencies.

Co-Production Process

There is no dedicated funding or staff time for this

Must be a community-based effort to address many different parties' needs

Also requires that the community take responsibility to implement the strategy when completed

1. Hosted science focused public workshop November 2022 to hear from community members
2. Coordinated with:
   - Agencies
   - NGOs
   - Environmental Justice experts
   - Tribes
   - Broader scientific expertise

Delta CHAB Strategy started in 2022 with a public workshop then follow-up coordination with a number of entities

1

DEFINE PROBLEM

There is a need for a collaborative and cohesive Delta cyanobacteria harmful algal bloom (CHAB) monitoring strategy

2

IDENTIFY DATA AND COLLABORATION GAPS

- Lack of routine monitoring
- Data only available for limited locations
- Need better understanding of drivers and interaction of drivers
- Collaboration gap among agencies
- No mechanism for collaboration
- Need standardized monitoring, easily accessible data, and training opportunities

3

DEFINE GOALS AND OBJECTIVES

1. Enhance Delta CHAB collaboration
2. Identify management questions, monitoring goals and objectives
3. Develop a Delta CHAB monitoring program
4. Develop collaborative reporting protocols
5. Utilizae a data sharing platform

4

IMPLEMENT RECOMMENDATIONS

- Leverage other projects and programs when possible
- Will need funding and partner buy-in to accomplish all recommendations
- 19 special studies are recommended that various groups could choose to lead

5

LEARN AND ADAPT

As knowledge base increases, the proposed monitoring strategy structure can be iteratively applied to evaluate progress toward defined management goals and to inform adjustments to the strategy, as needed.

Schematic showing the overall Delta CHAB strategy approach, including the 5 monitoring goals and plan for adaptive management.

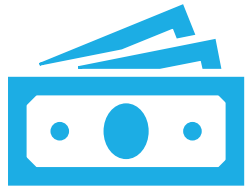
Status and Implementation of Delta CHAB strategy

Status

Draft releases and 30-day public comment period (March 2024)

Currently, addressing comments

Expect final version to be released later this summer



Implementation

No funding, but leveraging other ongoing efforts

- Leverage MERHAB project

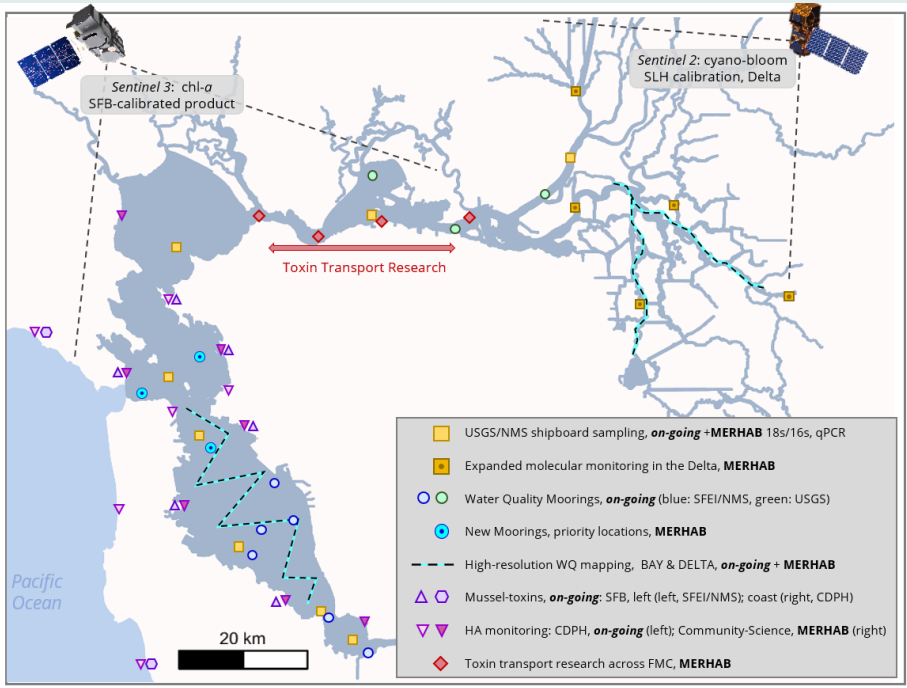
State Water Board funding USGS to develop monitoring design(s)

Delta Stewardship Council will continue hosting collaborative work groups to implement pieces of the strategy

19 special studies are recommended that various groups could choose to lead

The draft CHAB strategy will be release this summer and there are ideas for how to begin implementing it.

New Technologies and a Coordination Framework for an Integrated HAB Detection and Monitoring System across the San Francisco Estuary



Co-Lead PIs: D Senn (SFEI), K Bouma-Gregson (USGS), E Preece (DWR)

PIs: R Kudela (UCSC), A Chelsky (SFEI), T Otten (Bend Genetics), M Howard (CVRWQCB), T Mumley (SFBRWQCB)

Partners: SF Baykeeper, Restore the Delta, Cal State Maritime Academy, CA Department of Public Health

Timeline: 5 years | **Funding**: $3 million

MERHAB: Federally funded project to collaborate on HAB research, monitoring, and response across SFE

Project Objectives – NOAA MERHAB

1. **Enhance** existing monitoring data with new technologies and tools for rapid HAB detection and to further our understanding of HAB drivers and ecology.

2. **Integrate data streams** across programs and regions to deliver data rapidly to managers as decision support tools to help mitigate the impact of HABs.

3. **Fill data and knowledge gaps** about the **transport** of cells and toxins along the freshwater to marine continuum to inform monitoring strategies across ecological and management boundaries.

4. **Develop** a coordinated **HAB monitoring and management strategy** across the Estuary to improve HAB event response and manage HAB impacts.

Collaborative Approach: Special studies, data dashboard, and development of MaTAG to identify how project tools can be integrated into Bay-Delta water quality programs and water quality management decisions

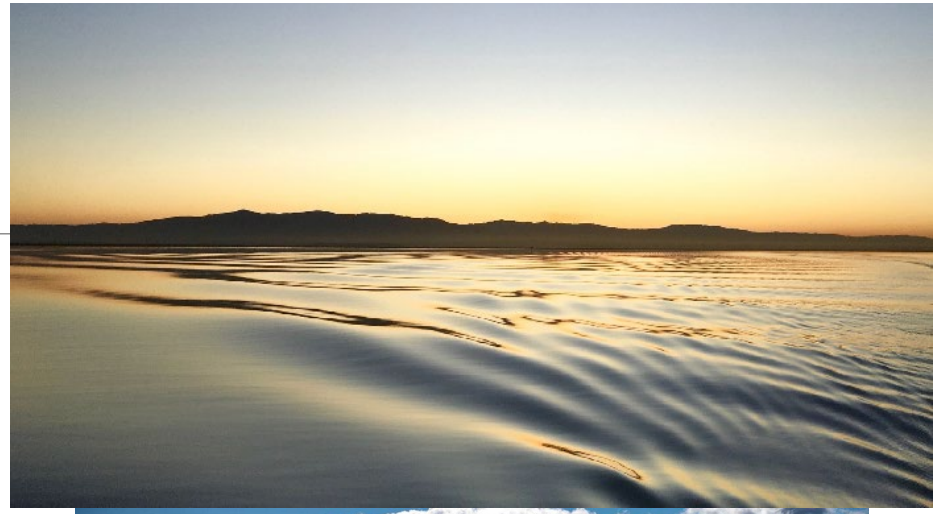
Impetus for MaTAG and Challenges to Managing HABs – NOAA MERHAB

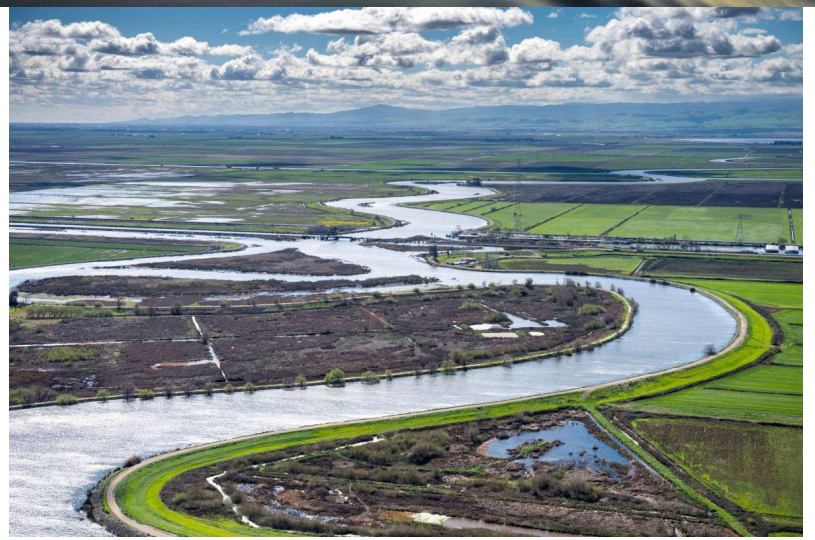
- Many groups focused on HABs but insufficient coordination
- No ‘one stop shop’ for HAB and WQ data in the Bay-Delta
- HAB technologies and tools exist but need to be customized for the Bay-Delta
- Overcoming these challenges requires coordination across different groups (local, state, community, research etc.)
- NOAA Grant provides funding for developing tools, but resources needed to maintain tools after the grant expires

MERHAB: Multiple groups recognize the need to work on HABs, but there is currently poor coordination and challenges regarding tools that can be used across the Estuary.

MaTAG Roles and Responsibilities – NOAA MERHAB

- Receive updates from MERHAB Co-PIs on progress of the project
- Provide feedback on the development of management relevant tools and **data dashboard**
- Identify how MERHAB tools can be integrated into Bay and Delta water quality programs after MERHAB funding concludes
- Assist with development of a coordinated HABs Strategy
  - Build off Delta CHAB Monitoring Strategy





MERHAB: Collaborate with managers across the estuary to develop a framework for responding to HABs.

Link between Delta CHAB strategy and NOAA MERHAB project

Schematic showing the links between the Delta CHAB Strategy and MERHAB project

Questions?

Ellen Preece
ellen.preece@water.ca.gov

Tricia Lee
tricia.lee@deltacouncil.ca.gov

https://deltacouncil.ca.gov/delta-science-program/collaborative-science