

August 27, 2026

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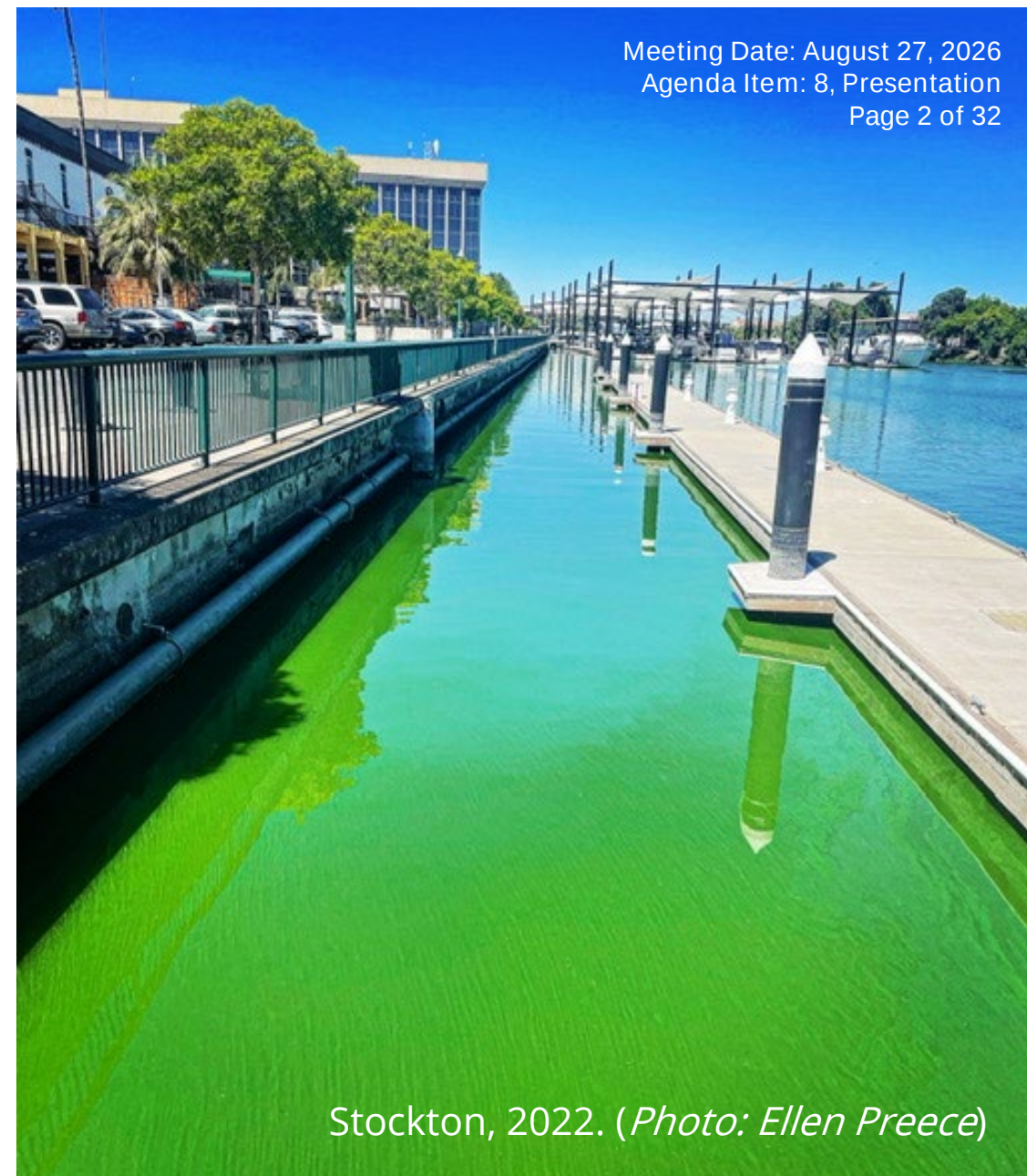
Delta Cyanobacterial Harmful Algal Blooms Monitoring Strategy

Overview and Implementation

**Ellen Preece, Keith Bouma-Gregson,
Laura Twardochleb, Nick Rowlands**

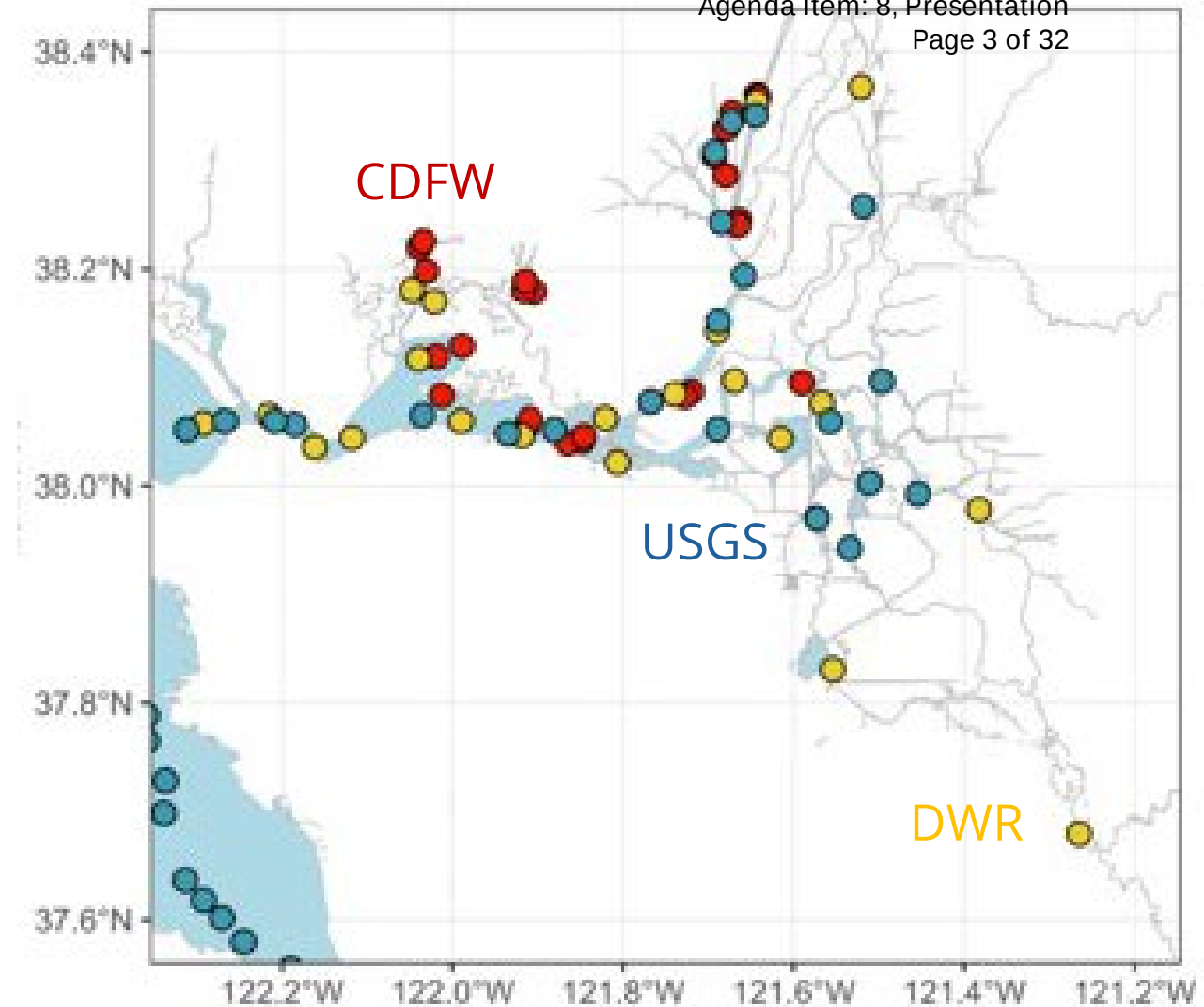
Cyanobacterial Harmful Algal Blooms (CHABs) in the Delta

- First documented in the Delta in 1999
- Now an annual summertime occurrence
- Cyanobacteria can produce toxins
- *Microcystis* the dominant toxin-producing cyanobacteria in the Delta



Need for Delta CHABs Monitoring Strategy

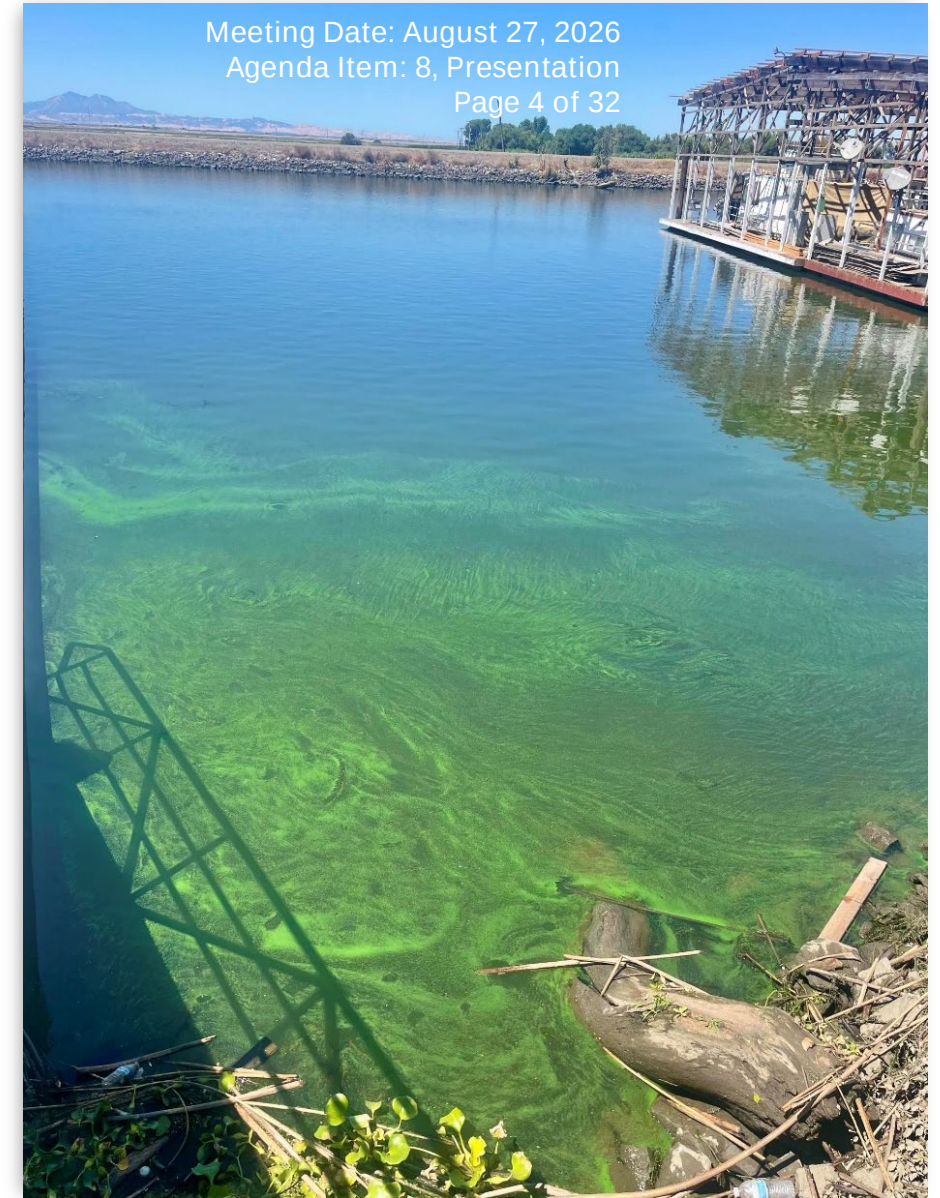
- CHABs monitoring is not adequately coordinated
- Lack of data on where, when, and why blooms occur and their impacts
- This info is needed to forecast, manage, and mitigate CHABs



Different monitoring stations are managed by different agencies
(Delta CHABs Monitoring Strategy)

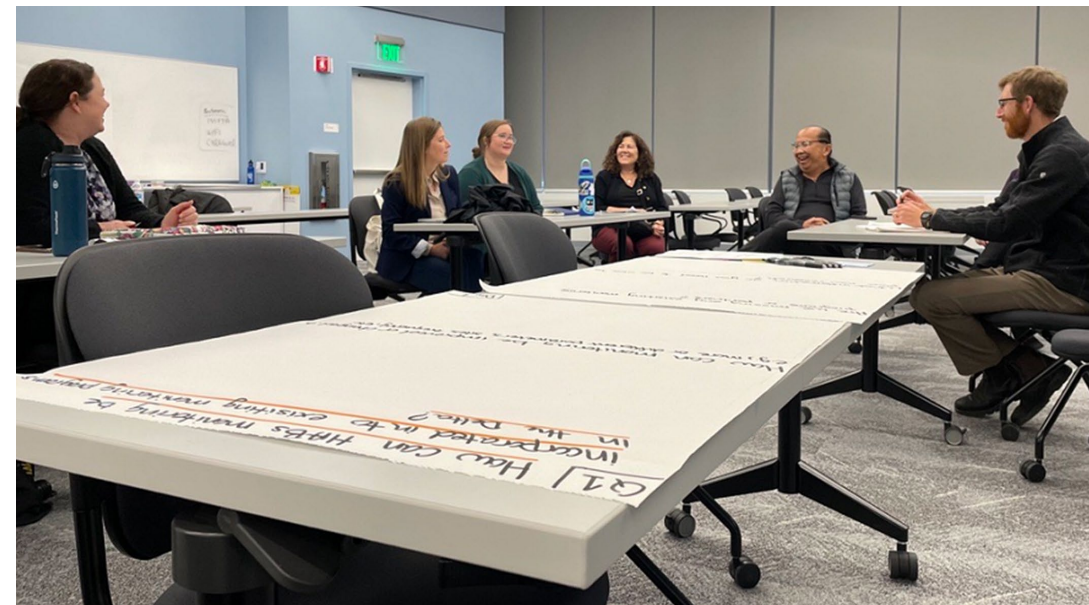
Collaborative development of the Delta CHABs Monitoring Strategy

2021: Central Valley Regional Board + CDFW approached the Delta Science Program for support creating a HABs monitoring strategy



Tiki Lagoon, 2024. (*Photo: Ellen Preece*)

Collaborative development of the Delta CHABs Monitoring Strategy



(Photo: Tricia Lee)

2022: Science Program public workshop to hear from community members

2024: Interagency team released strategy, written with input from interagency advisory group



Interagency
Ecological Program
COOPERATIVE ECOLOGICAL
INVESTIGATIONS SINCE 1970



Delta
Science
Program

DELTA STEWARDSHIP COUNCIL

Monitoring Strategy Goals



Goal 1: Enhance Delta CHAB Collaboration



Goal 2: Identify monitoring question, goals, and objectives



Goal 3: Develop a Delta CHAB monitoring program

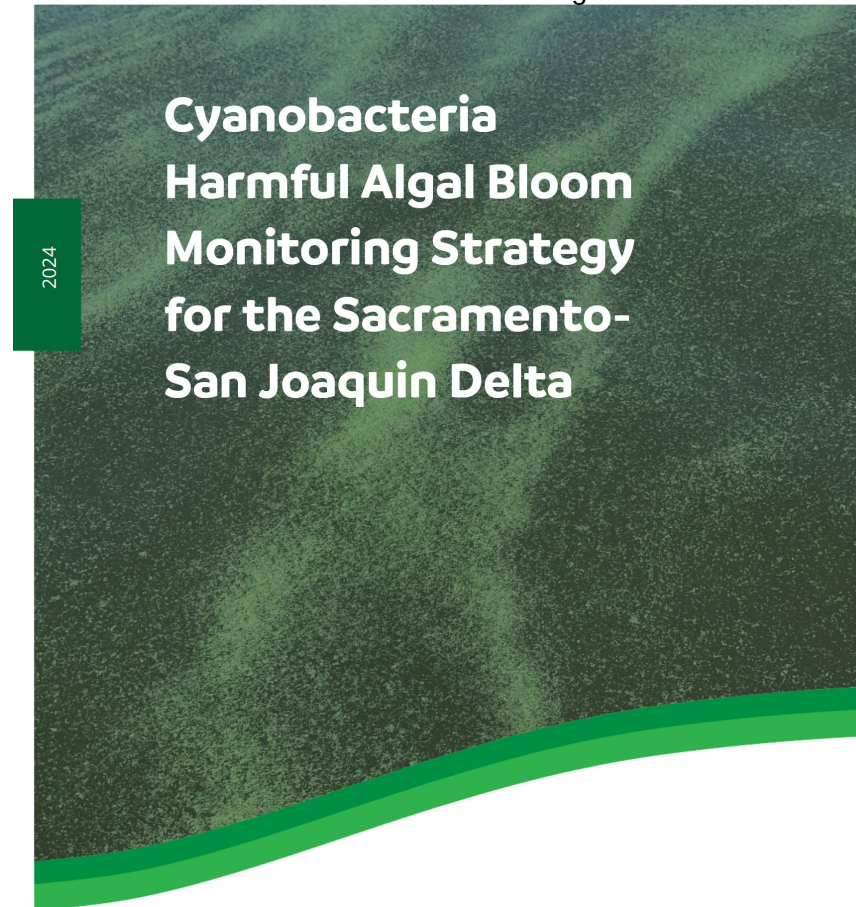


Goal 4: Develop collaborative reporting protocols



Goal 5: Utilize a data sharing platform

26 Recommendations to work towards achieving the goals
20 Special studies to fill knowledge and data gaps



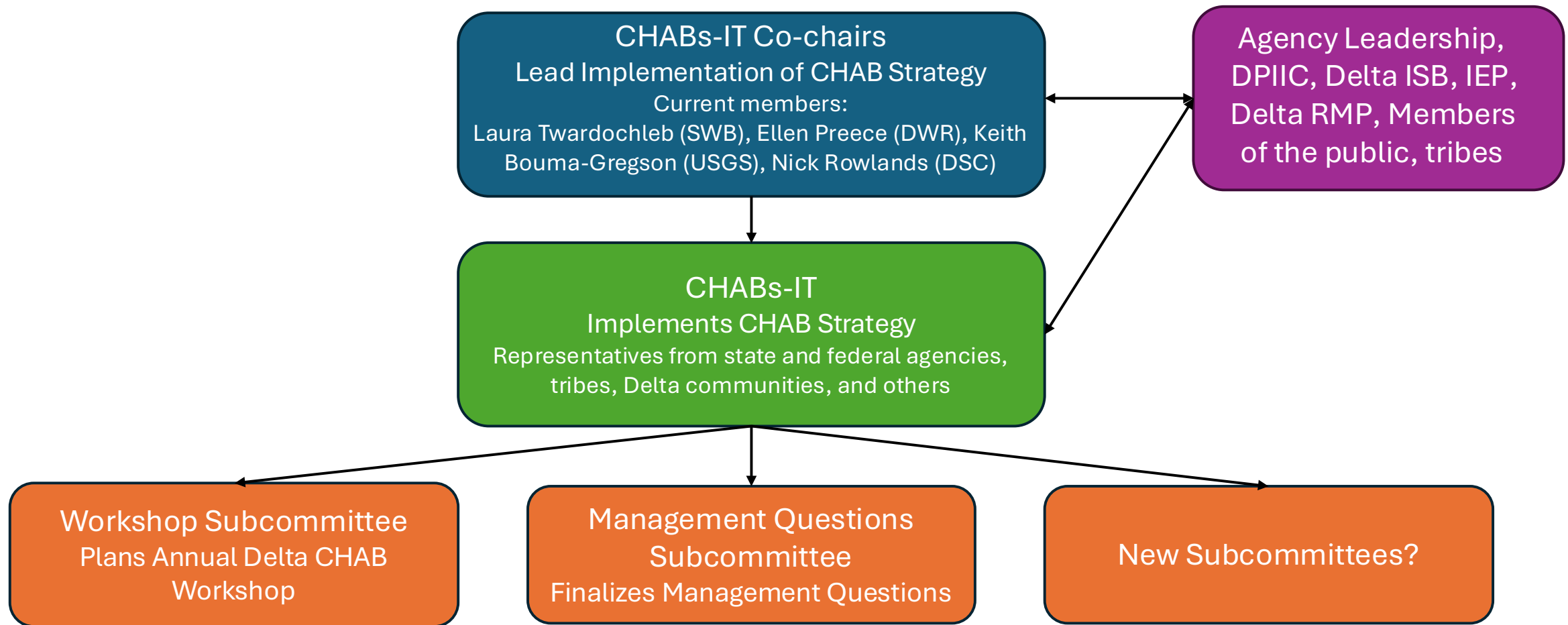
Preece, E., Berg, G. M., Lee, T., & Odkins, K. (2024).
Cyanobacteria Harmful Algal Bloom Monitoring Strategy for the Sacramento-San Joaquin Delta.
<https://deltacouncil.ca.gov/pdf/science-program/2024-10-21-final-delta-chabs-monitoring-strategy.pdf>

A group of people are gathered on a boat, looking at a presentation board. The board is titled "Cyanobacterial HABs (CHABs) in the Delta" and features a map of the Delta region with various locations marked. One person is holding up a smartphone to take a photo of the board. The background shows a body of water and a city skyline in the distance.

Implementation Progress

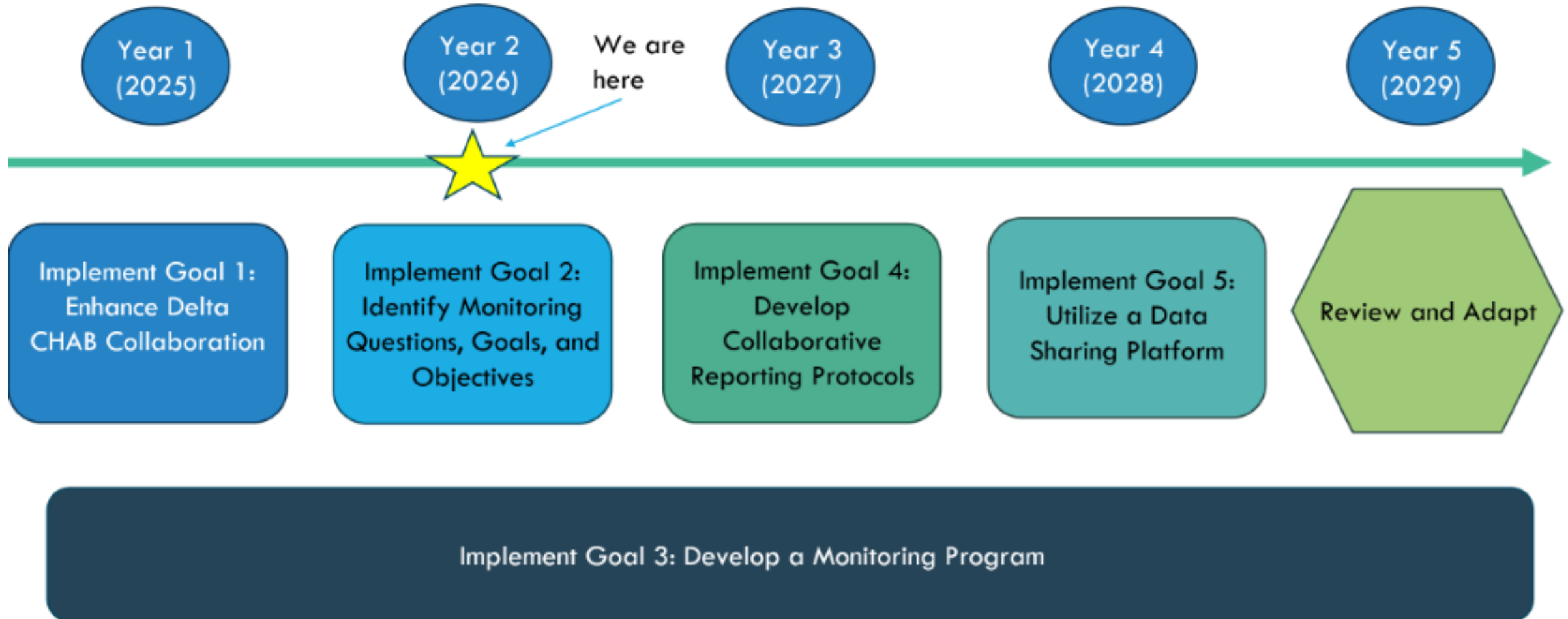
The success of the implementation of this Strategy falls to the ongoing coordination and collaboration of the Delta science community

CHABs Implementation Team Organization Structure (CHABs-IT)



(Delta CHABs Monitoring Strategy Implementation Team)

Implementation Roadmap



Implementation Progress

Goal 1: Collaboration

- Annual CHABs Workshops (2025, 2026)
- Quarterly Implementation Team meetings
- Charter posted to IEP website
- Monthly co-chairs meetings
- 2026 subcommittee to develop 5-year implementation roadmap

2025 CHABs Workshop Attendees



(Photo: Keith Bouma-Gregson)

Implementation Progress

Goal 2: Management Questions

- Subcommittee convened to finalize CHAB management questions & develop report, e.g.
 - Status & trends
 - Environmental drivers
 - Public health
 - Modeling
 - Mitigation & prevention
 - Management actions
 - Environmental impacts



State Water Board HABs advisory sign
(<https://mywaterquality.ca.gov/habs/resources/signage.html>)

Implementation Progress



Fishing on Twitchell Island. (*Photo: DWR*)

Goal 3: Develop a Monitoring Program

- Synthesize data to identify regional patterns in CHABs
- CHABs Monitoring Designs Report
- New proposed Bay-Delta Plan HAB monitoring requirements
- 20 special studies recommended

Implementation Progress

Goal 4: Develop Collaborative Reporting Protocols

- *Microcystis* Visual Index (MVI)
 - DWR and Delta Science Program funded project

Goal 5: Utilize a Data Sharing Platform

- Subcommittee on data integration



Discovery Bay, July 2026. (Photo: Ellen Preece)

2026-2027 Priorities



Finalize management questions report



Plan annual workshop for spring 2027



New sub-committee on Implementation Roadmap



New sub-committee on Data Integration



Identify funding for additional special studies and implementation

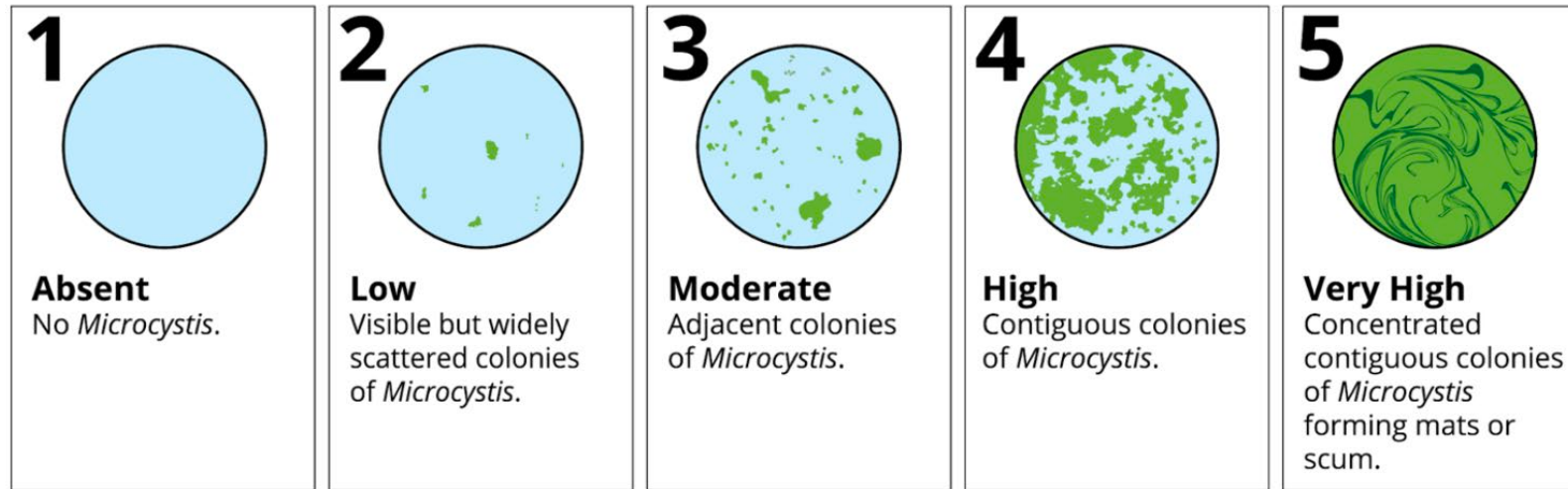
An aerial photograph of a lush green landscape. A winding, light-colored path or road cuts through the greenery. In the upper left, there is a small, irregularly shaped body of water or a wetland area with some exposed brownish soil or rocks. The overall scene is a dense, green environment.

THANK YOU!
Quick pause for questions...

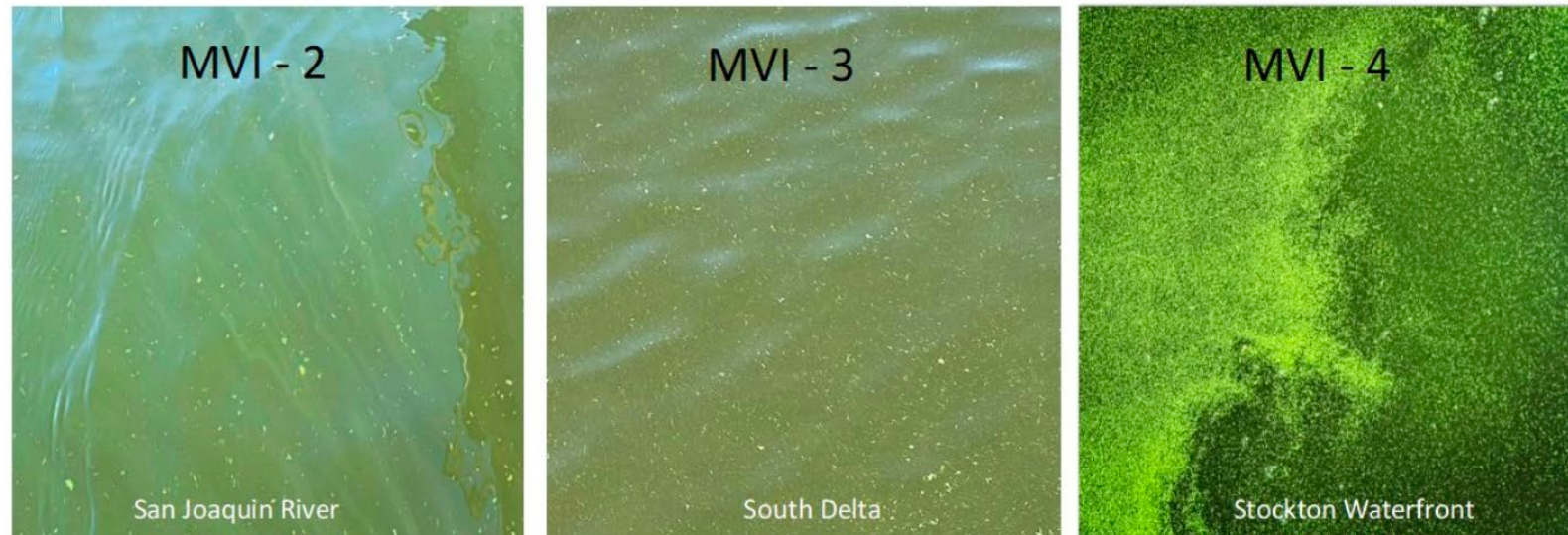
OPTIMIZING DELTA CHABS MONITORING TOOLS

Delta Science Program Funded

Microcystis Visual Index (MVI)



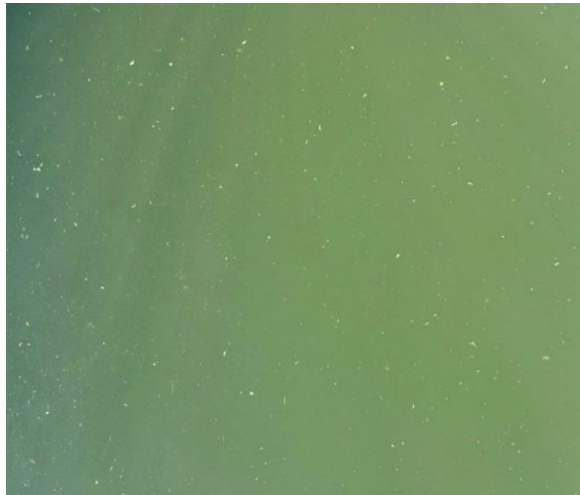
(Flynn et al. 2022)



(Photos: Ellen Preece)

Same Bloom, Different Score

- No instrument, just a person's judgment call
- Same bloom, different observers → different scores
- Light, wind, and time of day can shift the score too
- Scores are hard to compare across people, days, and sites



Columbia Cut, Sep 2025.



Turner Cut, Aug 2024. (*Photos: Ellen Preece*)

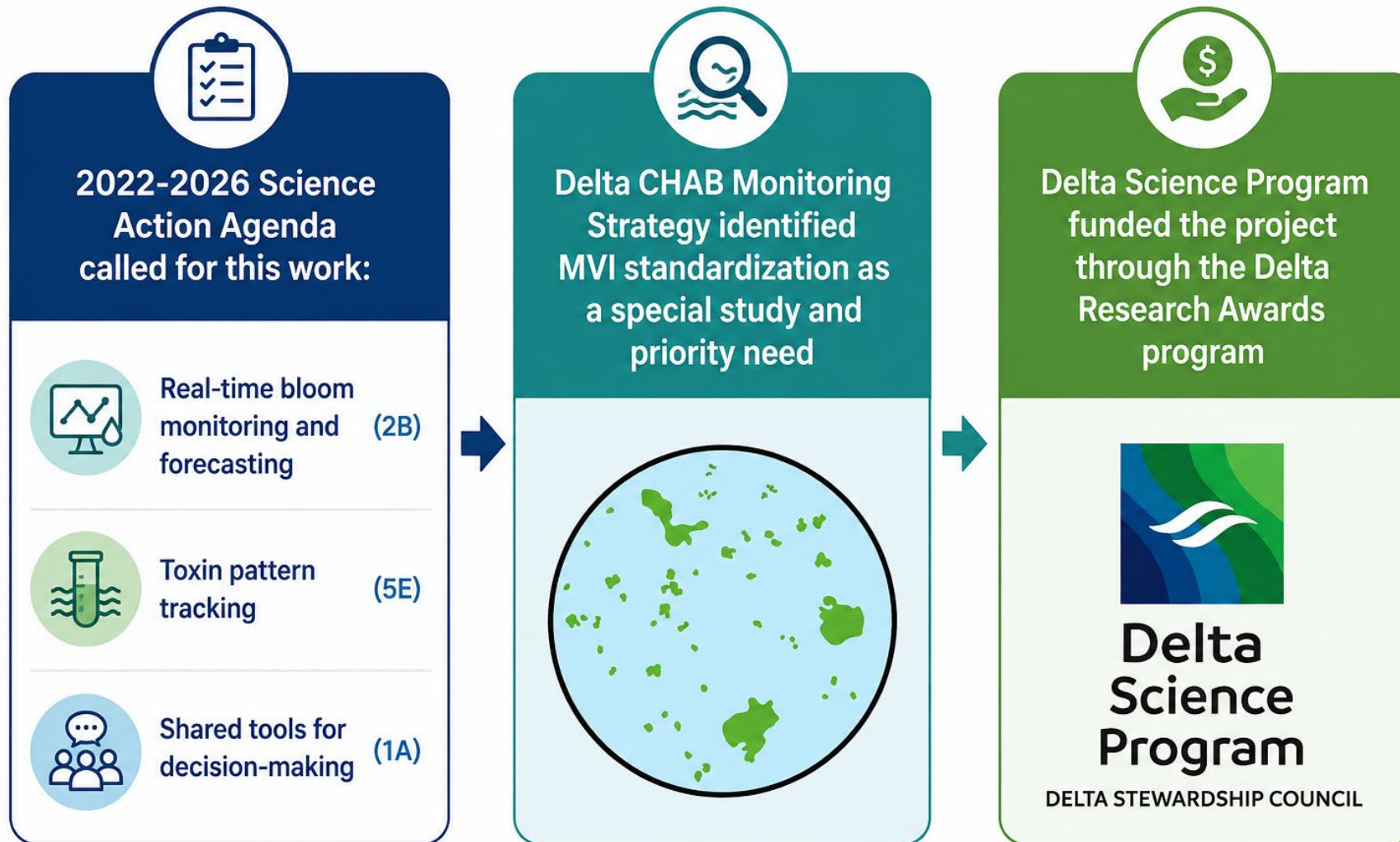
Project Aims

1. Remove observer bias by using digital photos and an image classification model to produce MVI rankings
2. Relate individual MVI rankings to biomass and toxicity of *Microcystis* through comprehensive field sampling



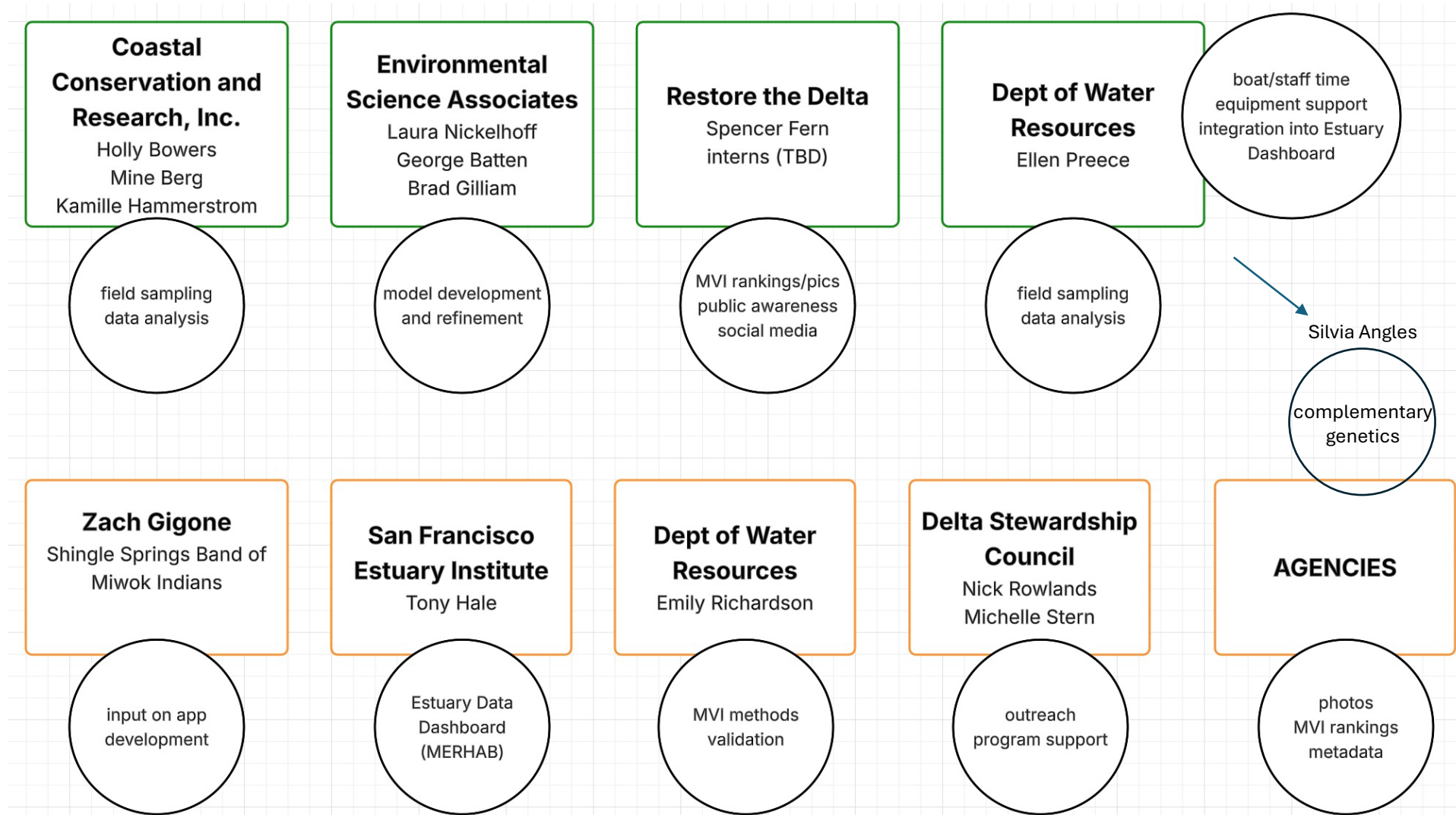
Stockton, July 2025. (Photo: Ellen Preece)

Turning a Strategy Priority into Action



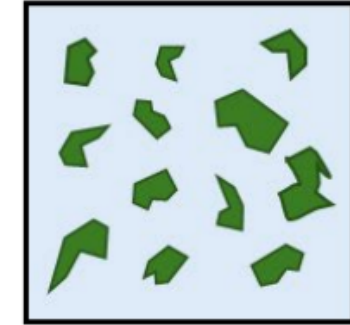
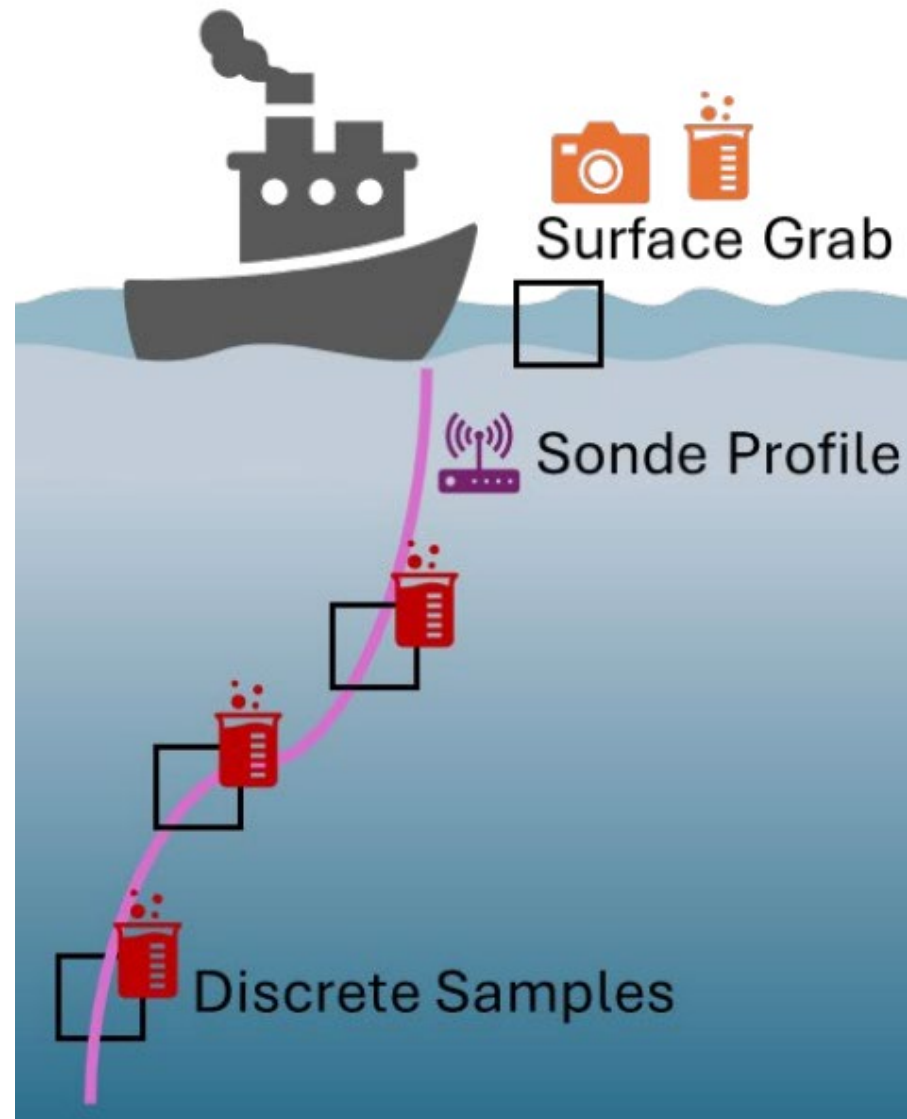
(Image generated using ChatGPT)

Leveraged Network



(Image: Holly Bowers)

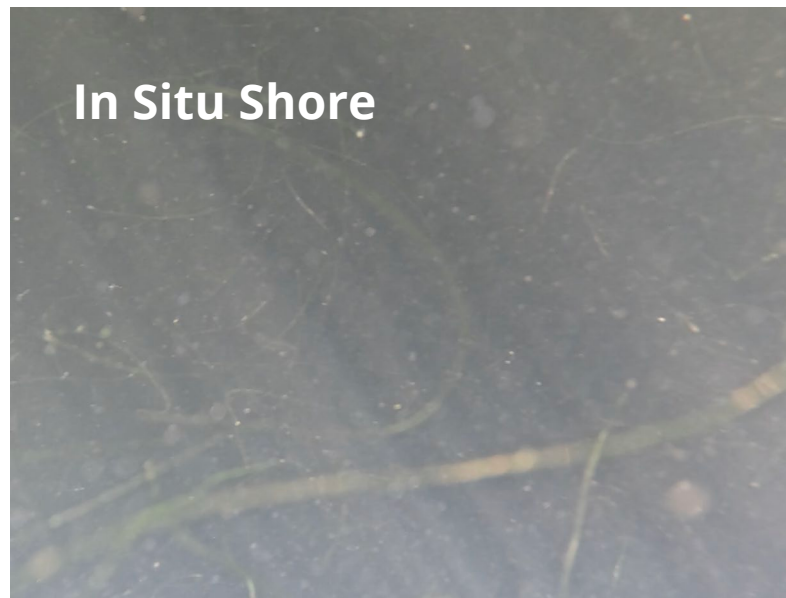
Field Sampling



- colony images
- counts & biovolume
- chlorophyll
- toxin gene
- microcystin
- nutrients

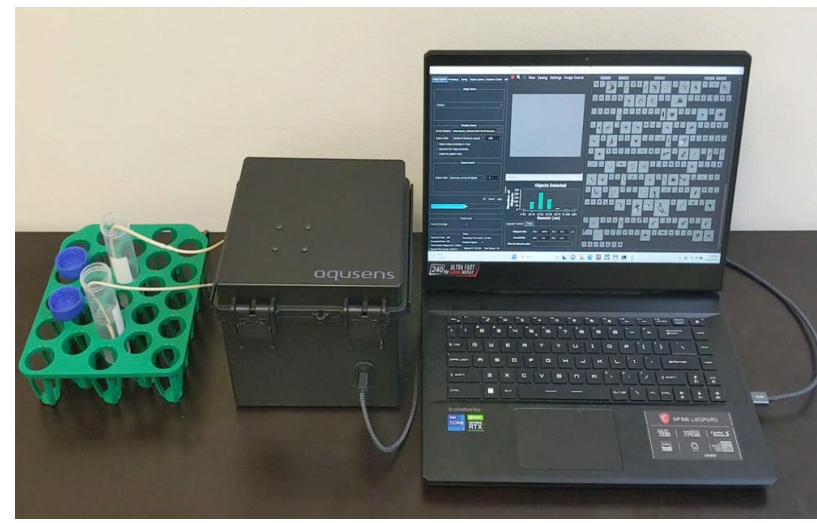
(Images: Holly Bowers)

MVI Method Comparison



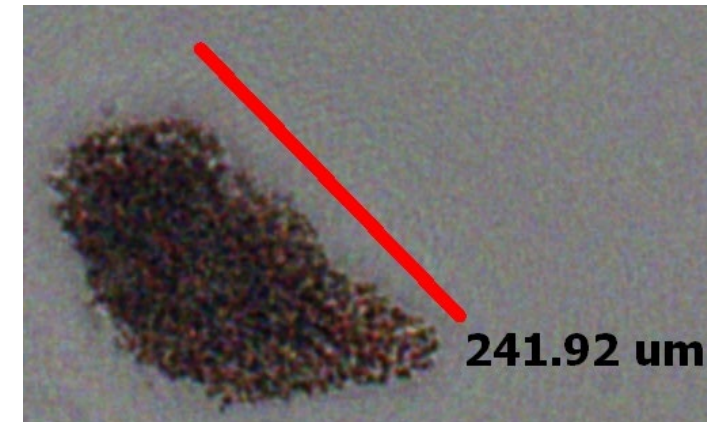
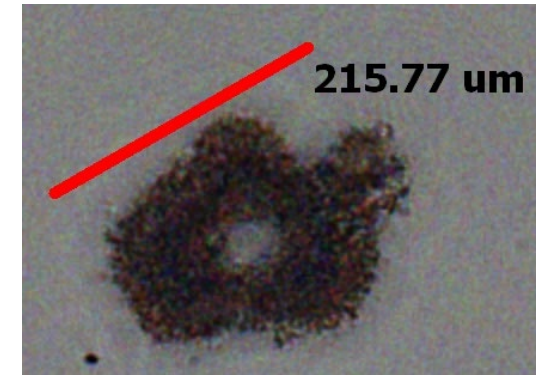


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*(Photos:
Holly Bowers)*



From Data to Decisions

- Phone app for standardized field scoring
- Faster, more reliable bloom alerts
- Supports public health and management decisions

Stockton Waterfront, July 2025.
(Photo: Ellen Preece)



Summary

- So much CHABs work is conducted in the Delta by many different organizations
- The Delta CHABs Monitoring Strategy helps define priorities and provides a framework for collaboration
- The overall goal is to support better public health and management decisions



Fishing pier in Rio Vista. (*Photo: Dale Kolke / DWR*)

A photograph of a marina with a large green algal bloom in the foreground water. In the background, there are several boats docked at a pier, including a large white boat with a red canopy. The water in the foreground is covered in a thick layer of green algae, while the water further back is a clear blue. The sky is clear and blue.

THANK YOU!
Any (more) questions?

Discovery Bay, July 2026. *(Photo: Ellen Preece)*

Examples of Delta CHABs efforts

Strategy

- CHABs Monitoring Strategy, Bay-Delta Plan

Monitoring

- FHAB, Delta RMP, Restore the Delta, Shingle Springs, East Bay Regional Parks

Research

- MVI, MERHAB, Stockton dredging

Data and synthesis

- NCEAS, cyanotoxin data, PESP

Modeling

- Collaboratory, machine learning

HABs Reports

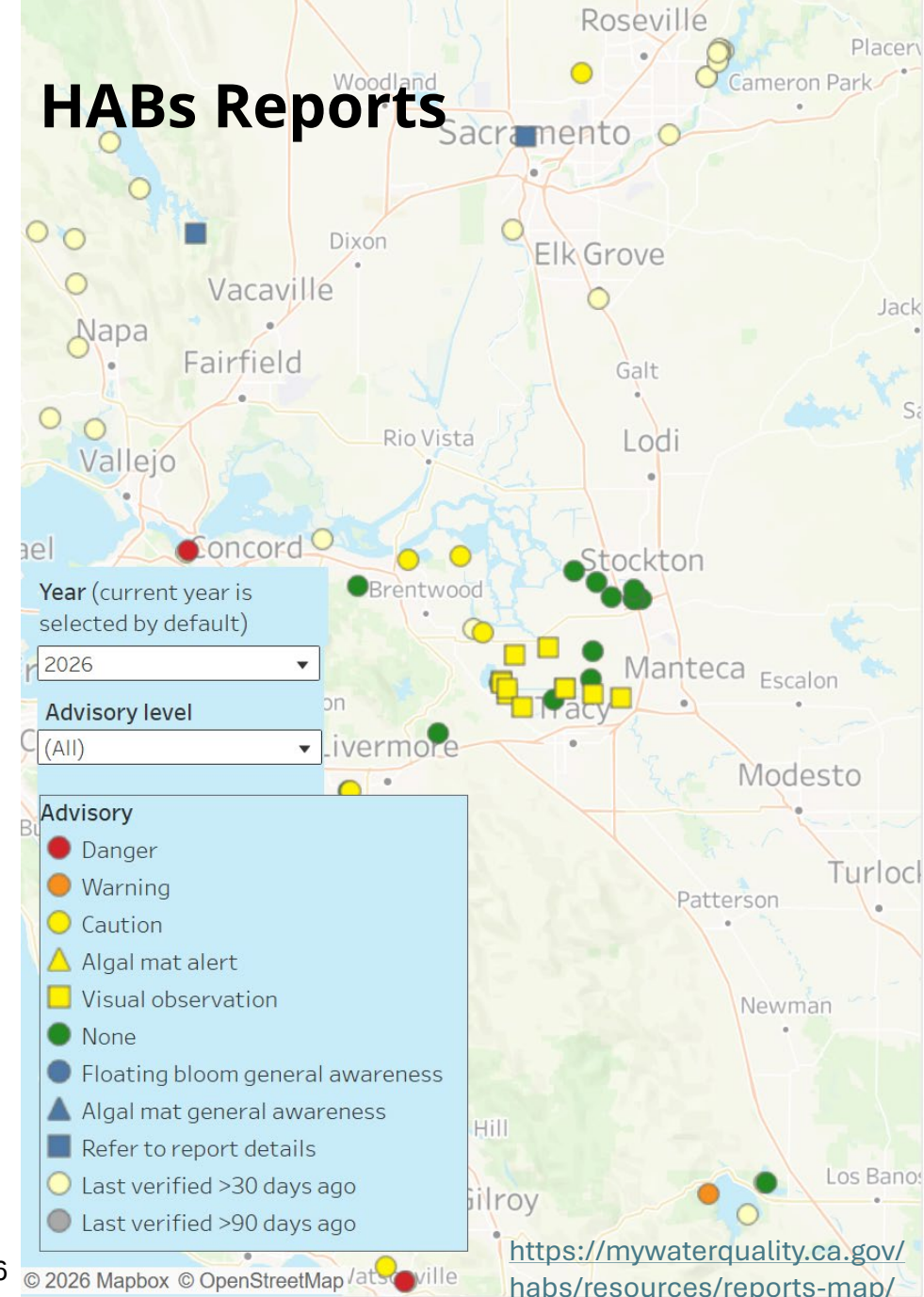
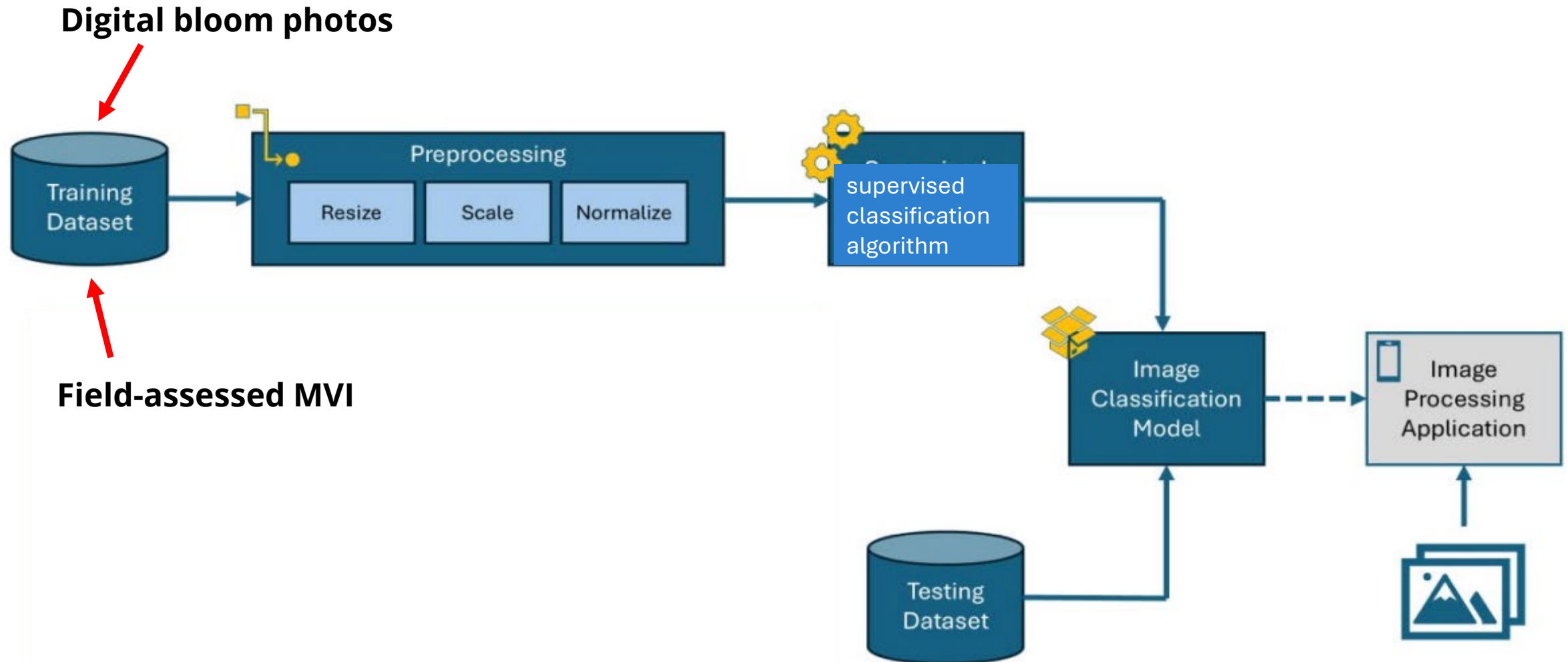


Image Classification Model



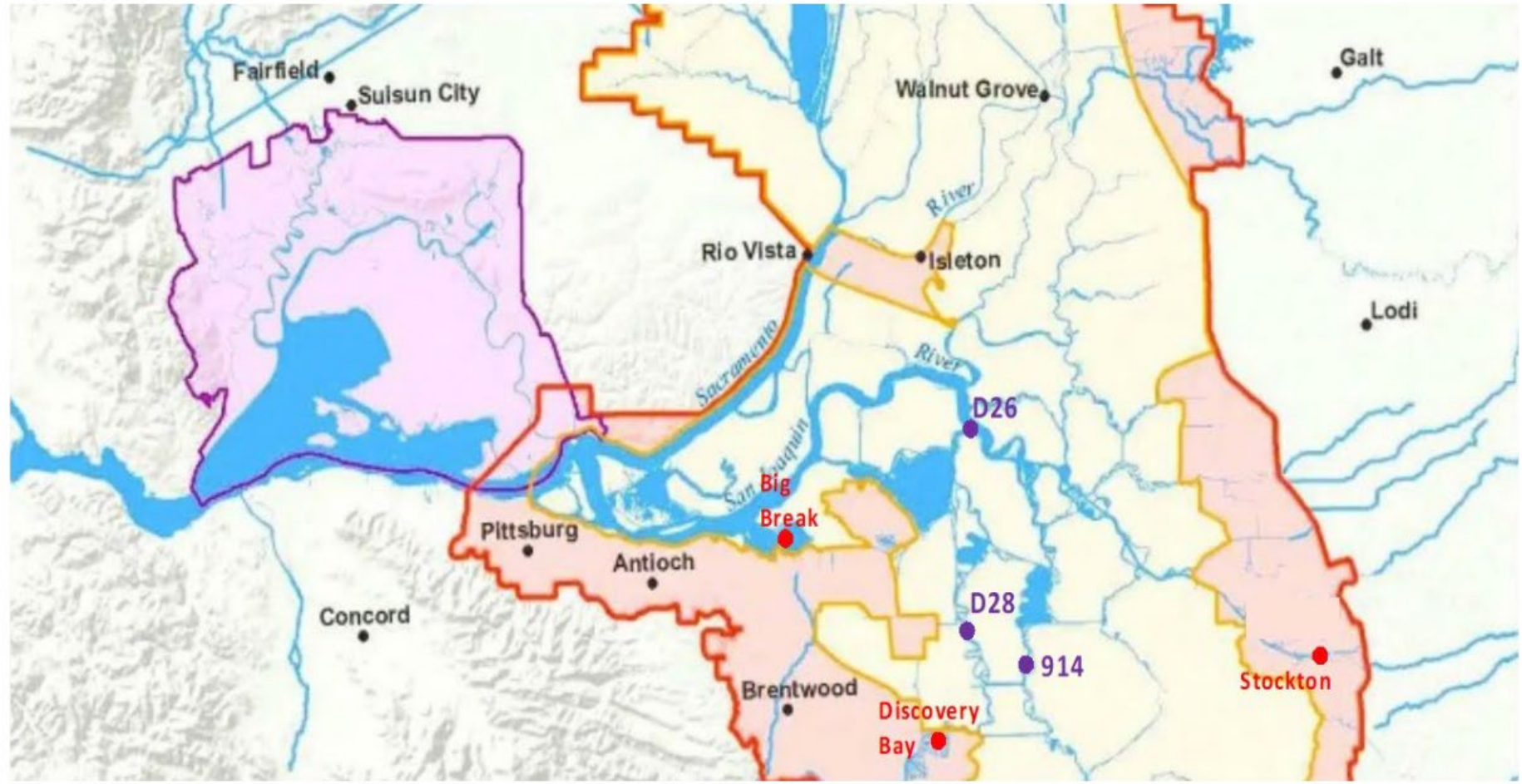
Sampling Locations

Monitoring Stations

- 14 trips in 2026

Boat transects

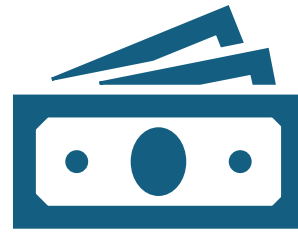
- 4 trips (DWR)



- dead end slough/marina locations
- open channel locations

Given that there are broad interests in Delta CHABs and there is no ongoing, dedicated funding for CHAB monitoring, the success of the implementation of this Strategy falls to the ongoing coordination and collaboration of the Delta science community.

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Implementation:

No funding, but leveraging other ongoing efforts

- Implementation Team with co-chairs created to lead coordination and implementation
 - (Laura Twardochleb, SWRCB; Keith Bouma-Gregson, USGS; Ellen Preece, DWR; Nicholas Rowlands, Delta Stewardship Council)
- Interagency Ecological Program Project Work Team identified as mechanism for keeping community informed
- Sub-committees within the team will develop individual implementation objectives

5-Year Roadmap: Implementing the Delta CHAB Monitoring Program

