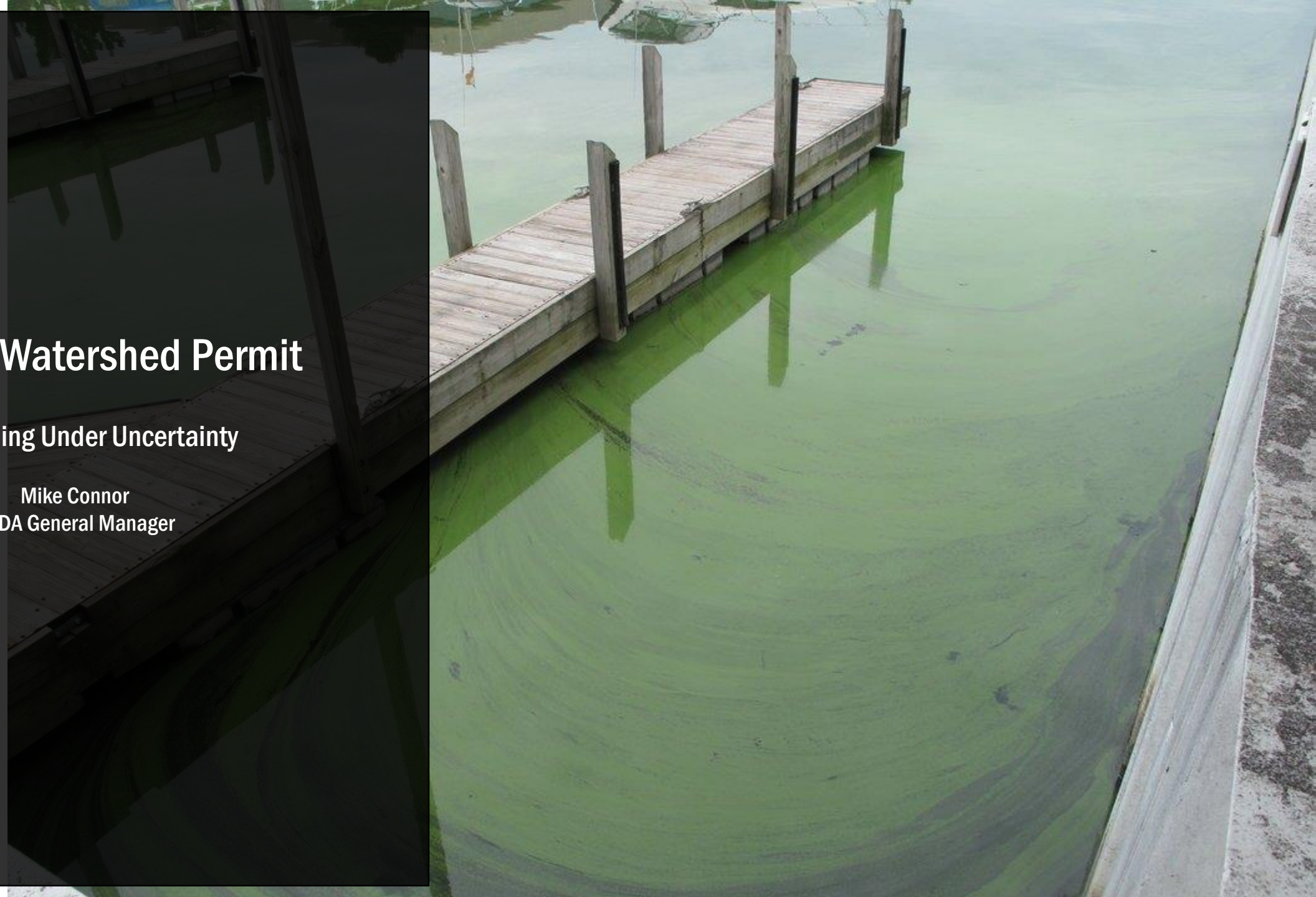
Nutrient Watershed Permit

Proceeding Under Uncertainty

Mike Connor
EBDA General Manager

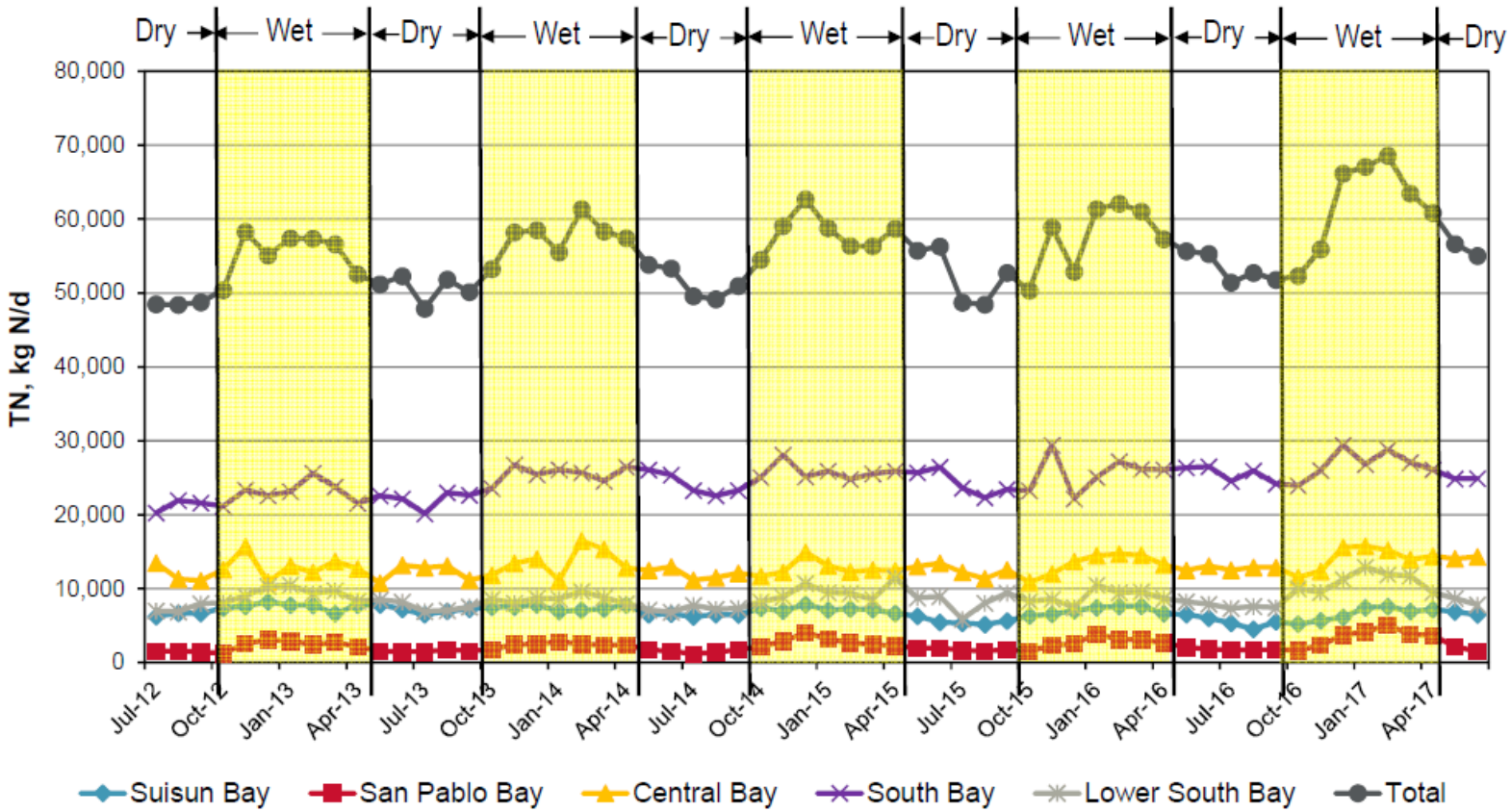


2014 Nutrient Watershed Permit

1. Monitor Effluent for N&P - Agencies
2. Report data and annual trends – HDR w/ CMG review
3. Evaluate Nutrient Discharge Reduction Options – HDR w/ CMG review
4. Support Monitoring, Modeling, Embayment Studies – NMSSC w/ SFEI
   - BACWA reps on Nutrient Management Strategy Steering Committee and Planning Subcommittee to direct allocation
   - BACWA Nutrient Surcharge $880K per year –up 2.5x new permit
   - In FY2018&19, BACWA contributes extra $200K to accelerate Science Program
   - Individual members have contributed additional funds to Science Program

2017 Group Annual Report: Total Nitrogen

- Both dry and annual average TN loads are increasing
- Dry season TN load is increasing in all Subembayments except Suisun Bay (decreasing) and Lower South Bay (no trend)



2017 Group Annual Report: Ammonia

- Dry season ammonia load is increasing in all Subembayments except Lower South Bay and Suisun Bay
- Total average annual ammonia load for 2016-17 was the highest since 2012 at 40,700 kg N/d

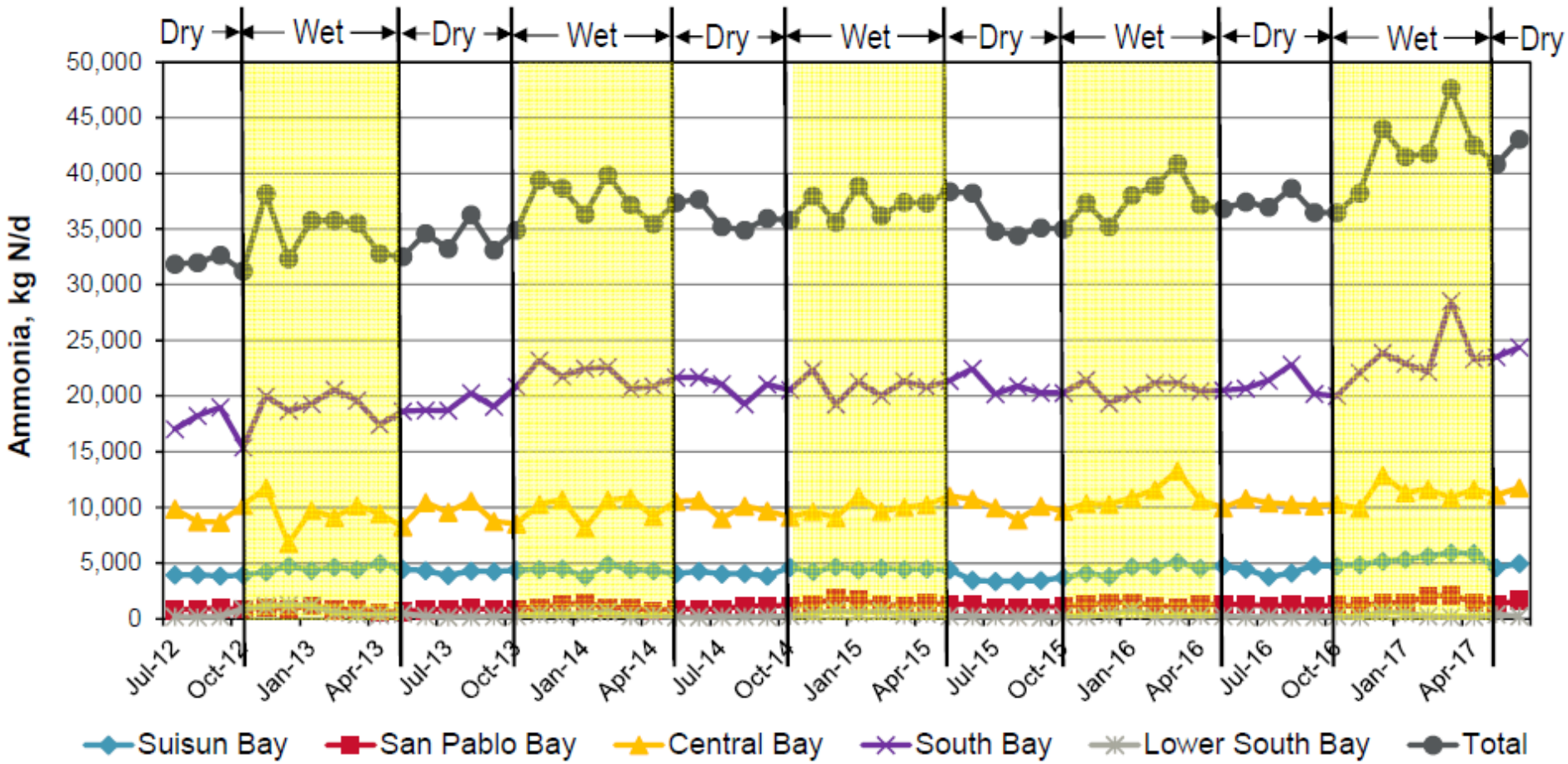
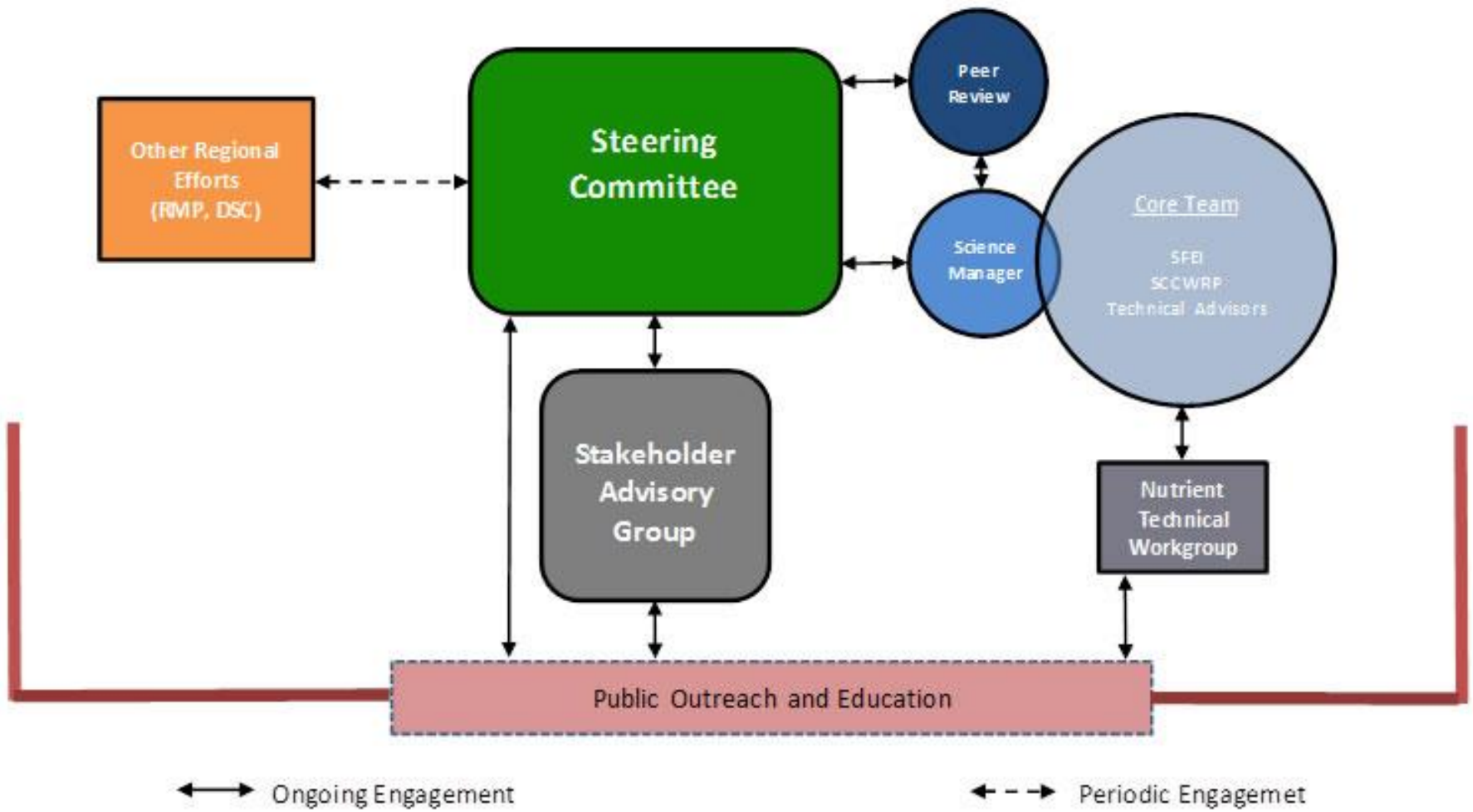


Figure 1 - Nutrient Management Strategy Organizational Structure



Watershed Permit Future Scenarios Are Dependent on Nutrient Management Science

1. Scientific Findings don’t support regulatory actions in 2024
2. Bay-wide Load Caps in 3rd WS Permit
3. Load caps implemented only in high risk subembayments
4. Events prompt the WB to implement load caps in 2nd WS Permit

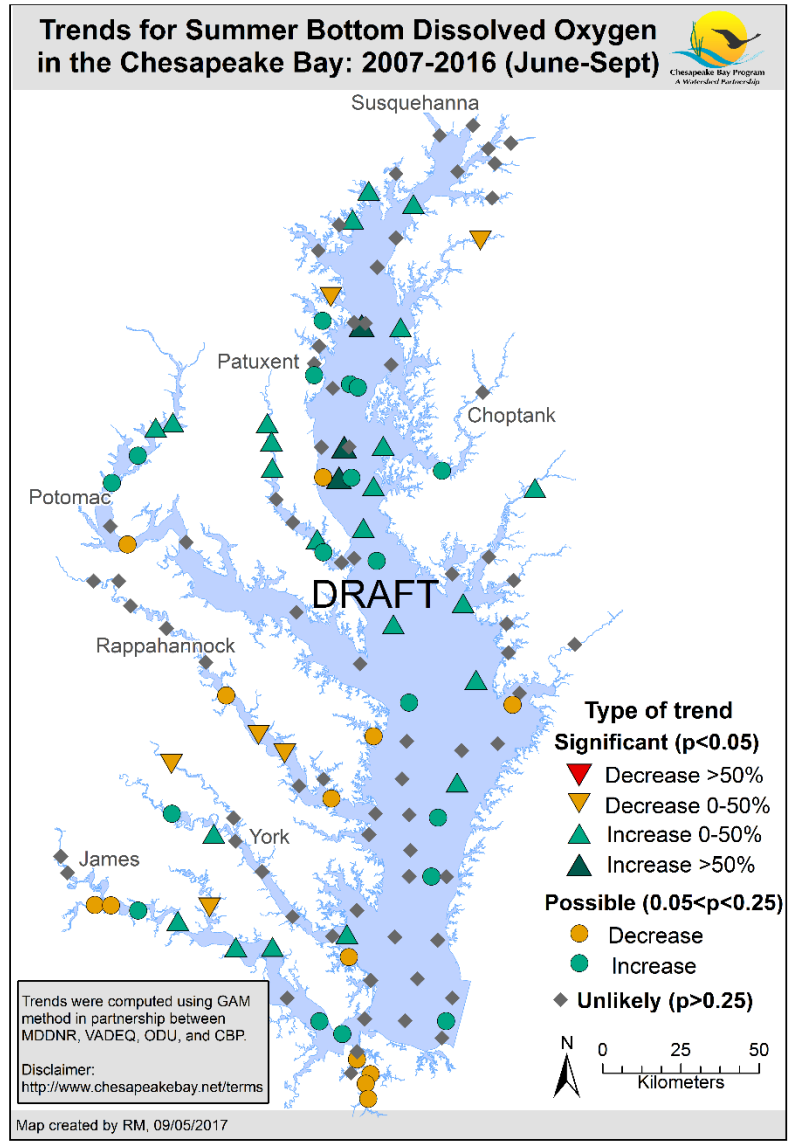
What scientific findings would impact management decisions?

Water Quality is declining
Water Quality has crossed a threshold

Chesapeake Tidal Trends Analysis History

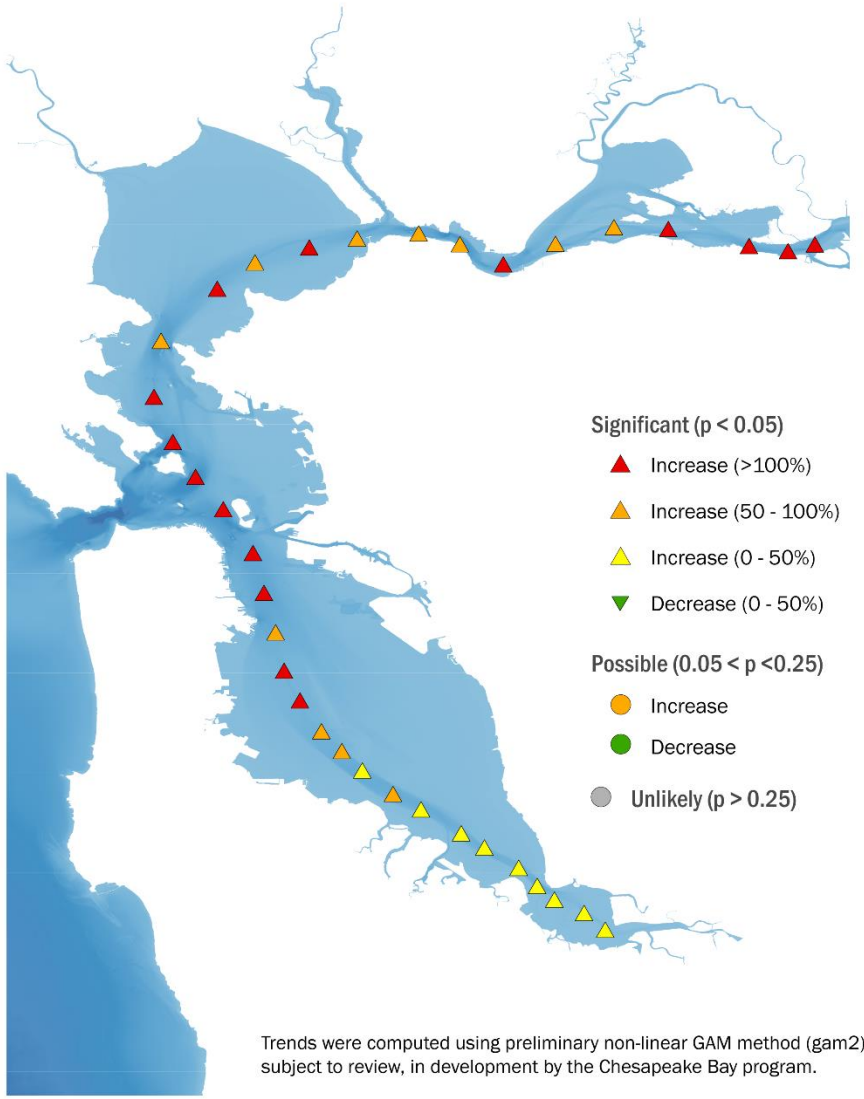
Bay-wide trends used for:

- Tracking change
- Visual tool for management audiences
- Identifying areas for further research



Annual Trends for Chlorophyll-a in San Francisco Bay

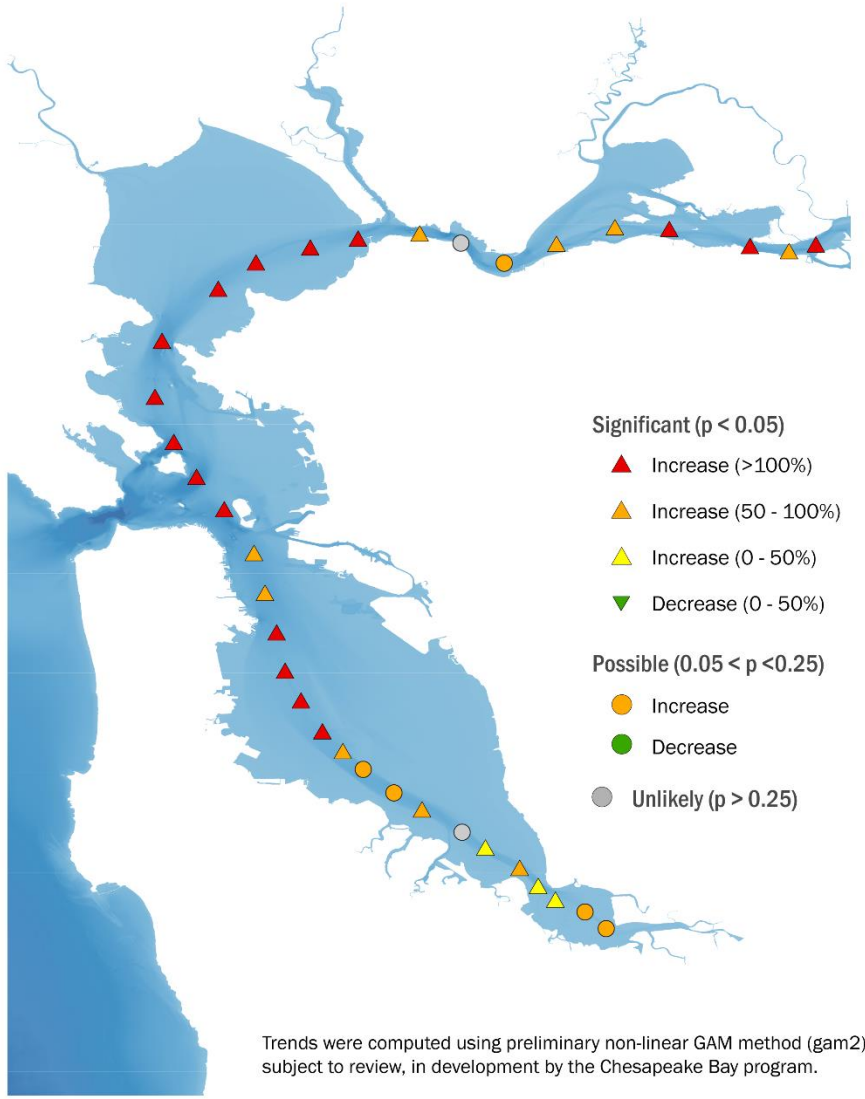
surface layer data (2 m) from 1993 to 2017 (non-linear gam2 model)



Trends were computed using preliminary non-linear GAM method (gam2), subject to review, in development by the Chesapeake Bay program.

Annual Trends for Chlorophyll-a in San Francisco Bay

bottom layer data (~2 m) from 1993 to 2017 (non-linear gam2 model)



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Annual Trends for Dissolved O_2 in San Francisco Bay

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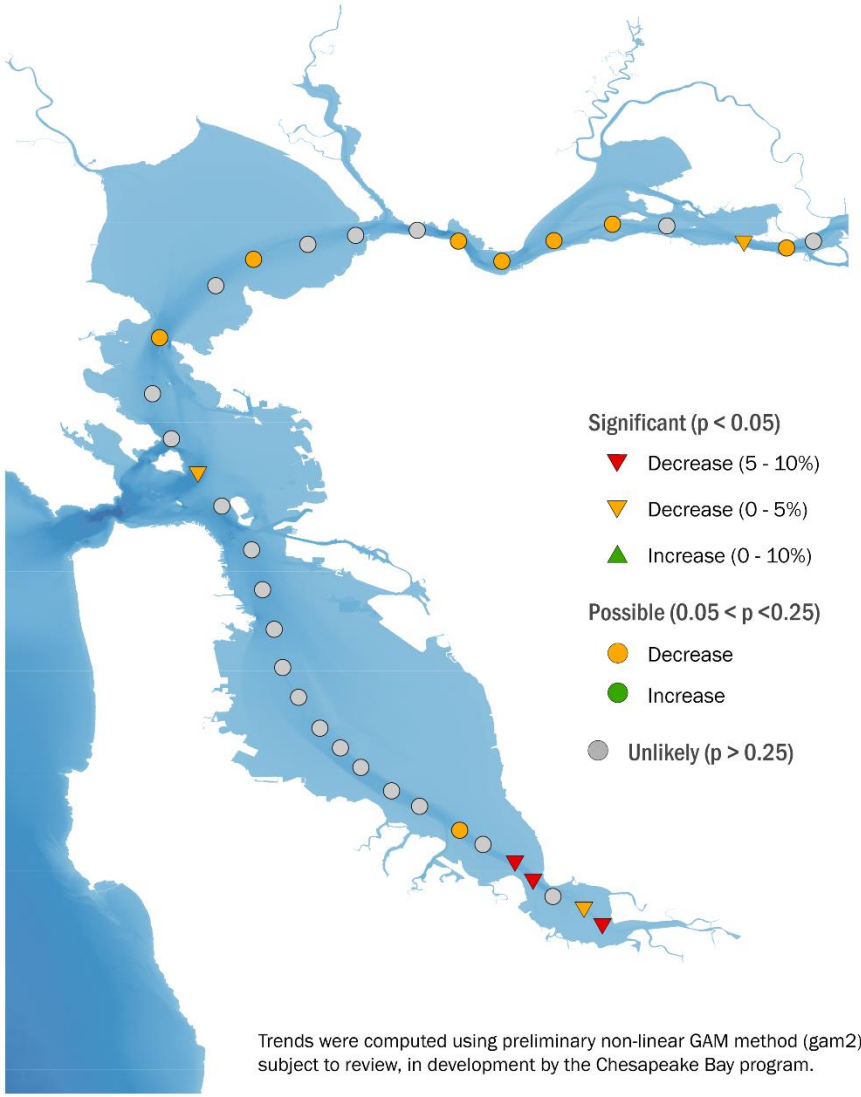

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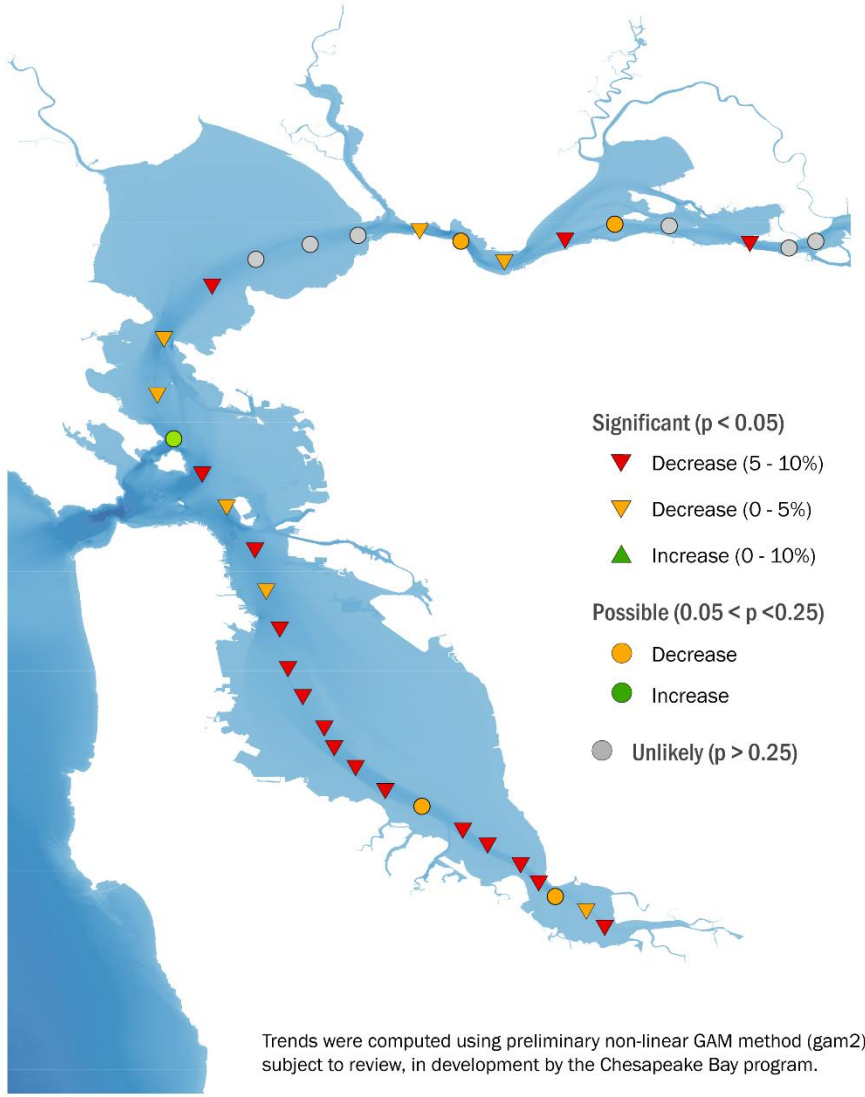

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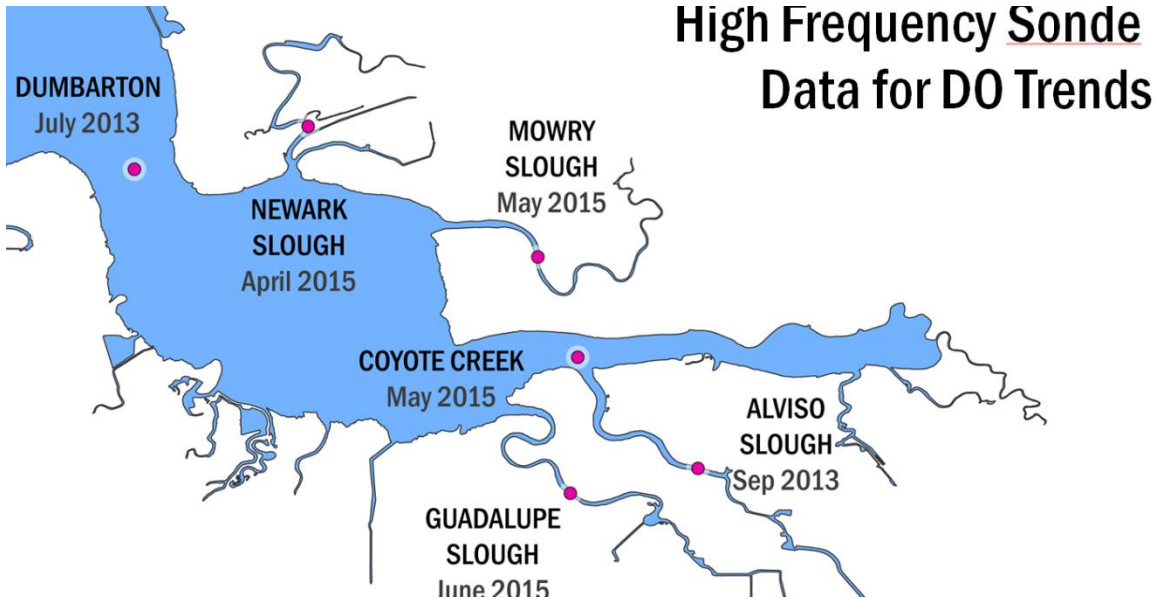
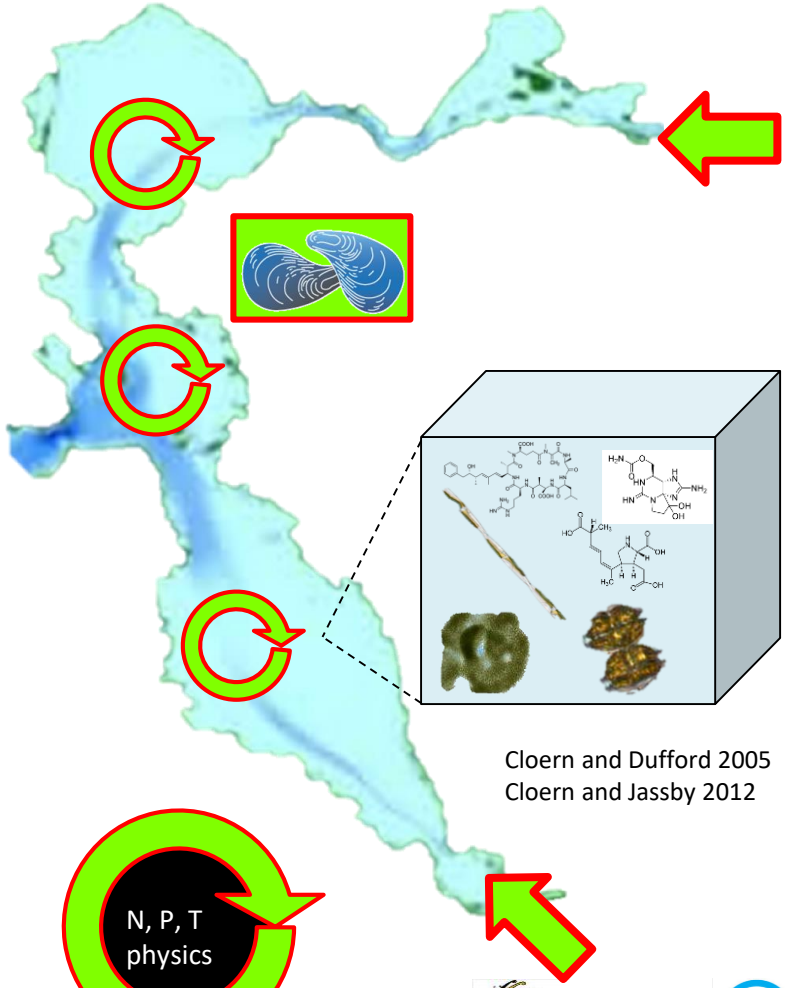
2017 DO and HAB Workshops Approach to Thresholds

Dissolved Oxygen Workshop



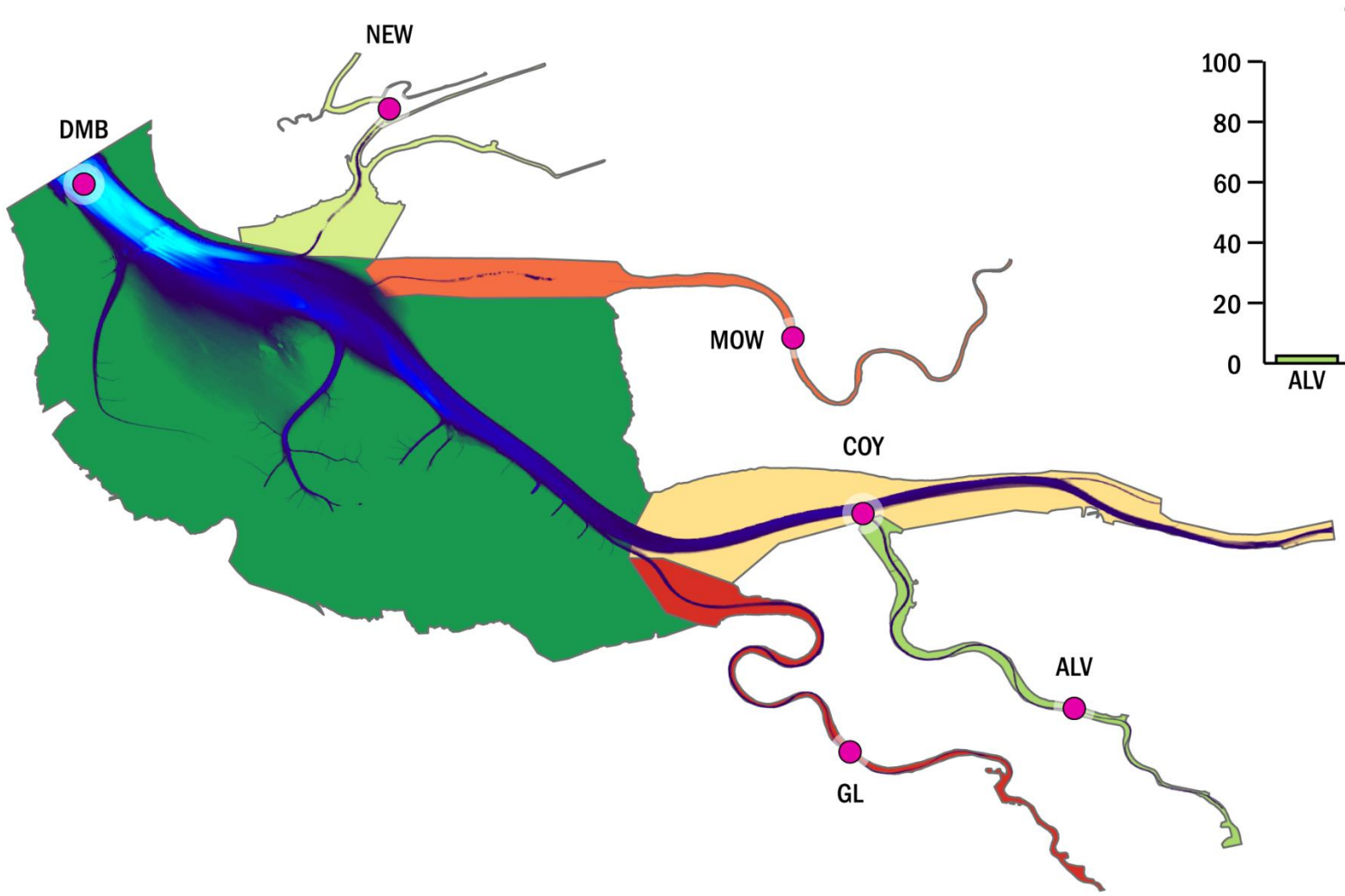
High Frequency Sonde Data for DO Trends

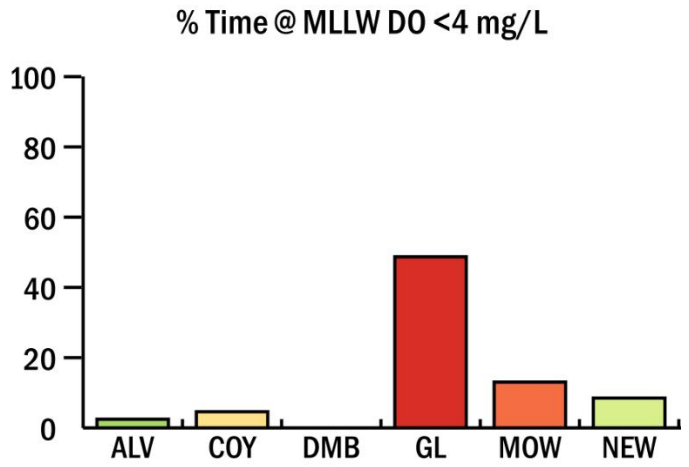
Harmful Algal Bloom Workshop



Cloern and Dufford 2005
Cloern and Jassby 2012

South Bay Channels Seeing Very Different Oxygen (7/15 – 7/17)

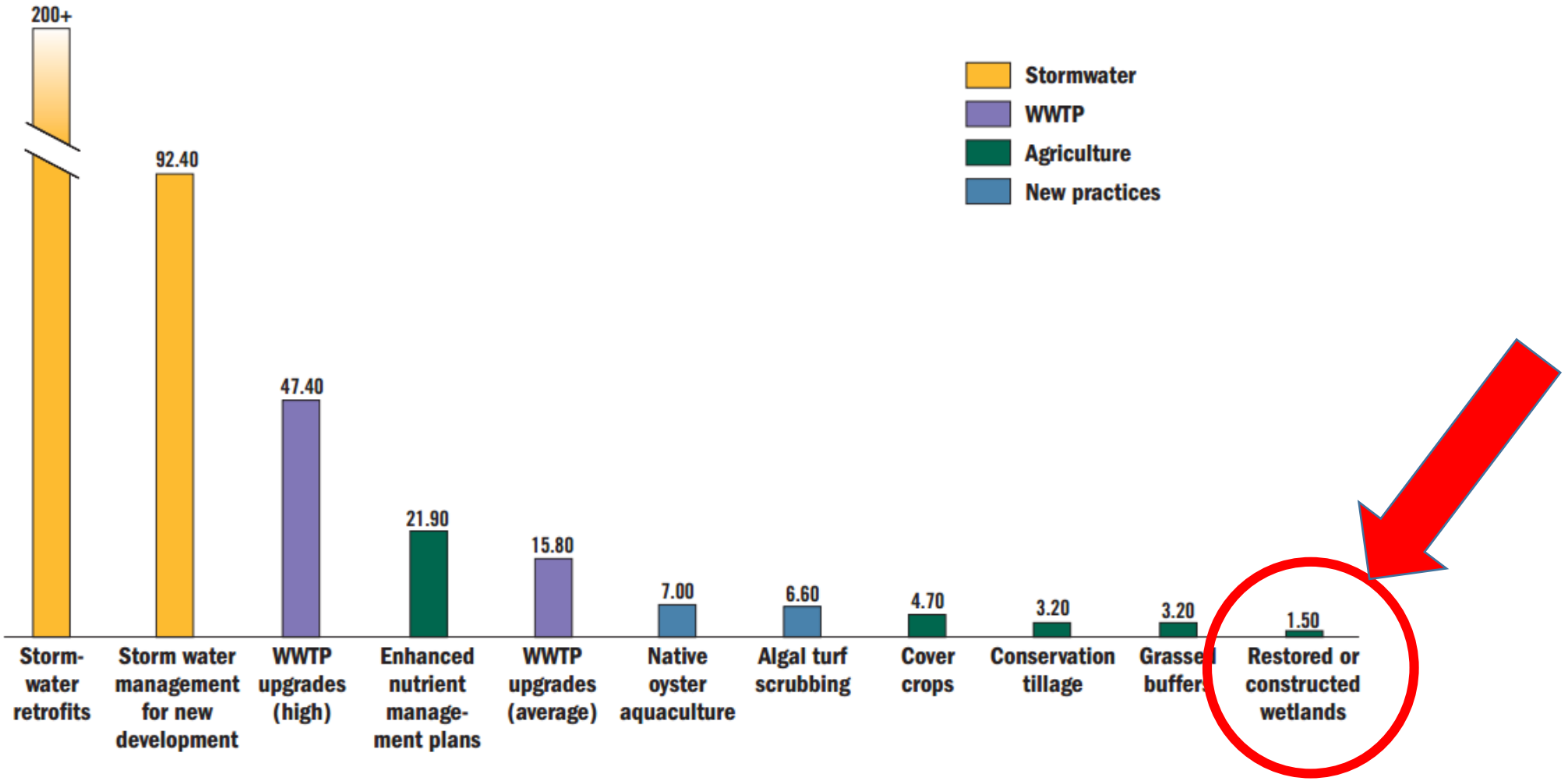




Other Activities of Nutrient Management Group

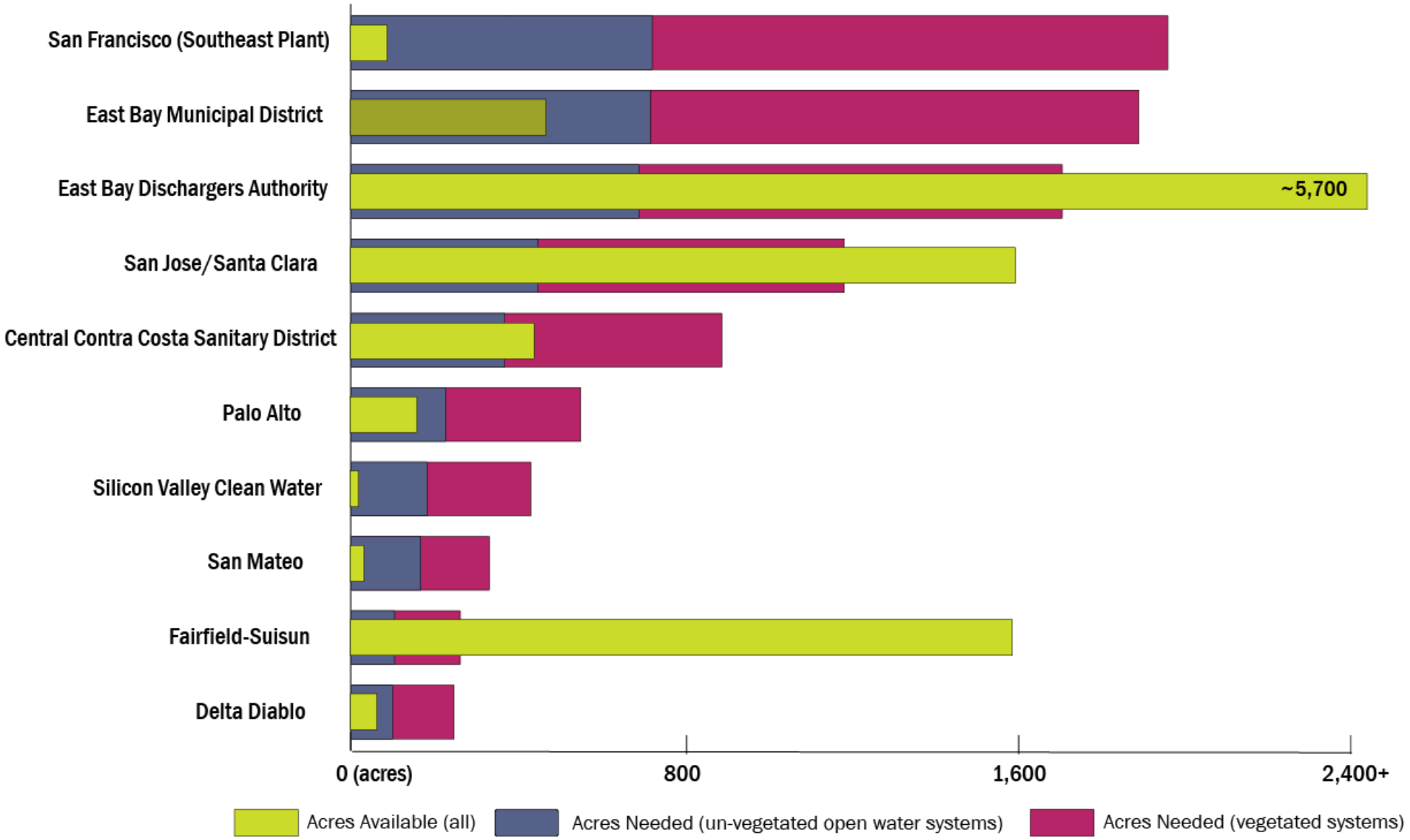
Figure 2 | **Nitrogen Reduction Costs Differ Among Sectors and Practices, Creating Economic Opportunities for Credit Trading**

Dollars per pound of annual nitrogen reduction



Source: U.S. EPA and Abt Associates, 2009; Wieland, et al., 2009; MDNR, 2008; Stewart, E. A., 2006; WRI analysis using WWTP upgrade costs from MDE and VDEQ.

Where Do Green Infrastructure Strategies for Nutrient Control Exist?



Improving Monitoring Bang-for-Buck: Coordination with IEP

Developing a Nutrients Project Work Team with the Delta-based Interagency Ecological Program

Data Synthesis and Monitoring Optimization

- Ensure consistent monitoring approaches throughout the Bay-Delta
- Eliminate/combine monitoring stations to enhance efficiency and reduce waste
- Identify opportunities for data synthesis and answering unaddressed management questions with available data
- Collaborate on survey cruises or fill station-specific data gaps to reduce costs and enhance capacity

Communication and Coordination

- Advocate for the maintenance of state and federal funding for key monitoring programs and special studies
- Modernize data collection processes and enhance long-term monitoring efficiency throughout the Bay-Delta

Project Development

- Identify nutrient-related special studies for IEP or other programs
- Identify ‘next-generation’ studies to address knowledge gaps that are not being tackled by other groups.

Alternatives SF Bay Nutrient Management Strategies

Develop N Standard & TMDL

- DO standards tough for shallow margins
- Bay Area biological impact tough to measure
- HAB not linked to nutrients in national regs
- Standards likely to be quite conservative

Weigh Alternatives & Evaluate Success

- Actions underway on recycled water
- Trade-offs between air/energy/water
- Some options not too cost-prohibitive
- Waiting for disaster to drive action will cause an over-response