Regional Monitoring Program Annual Meeting October 4, 2011

Nutrient Management In San Francisco Bay

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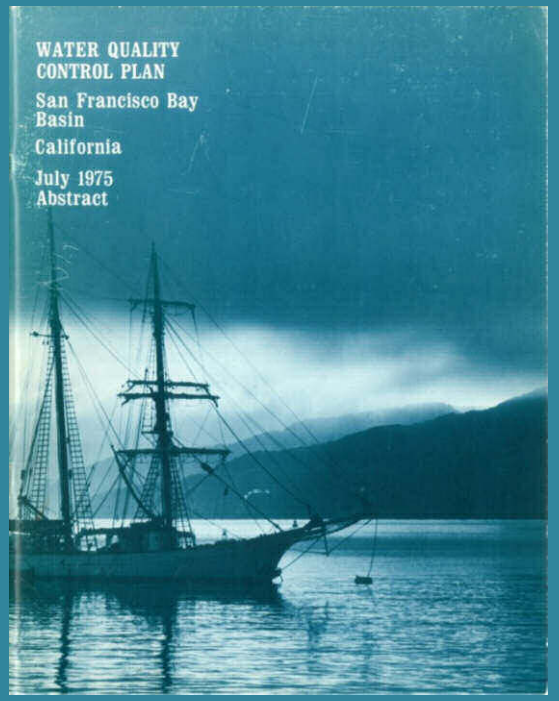
San Francisco Bay Regional Water Quality Control Board

California Water Boards
State Water Resources Control Board
Regional Water Quality Control Boards

The Past

- Conventional Wisdom
  - Nutrients don't matter
  - Always in abundance
- 1975 Basin Plan
  - High turbidity in Bay
  - Light limited system
  - Limited treatment for nutrients necessary



Current Challenges

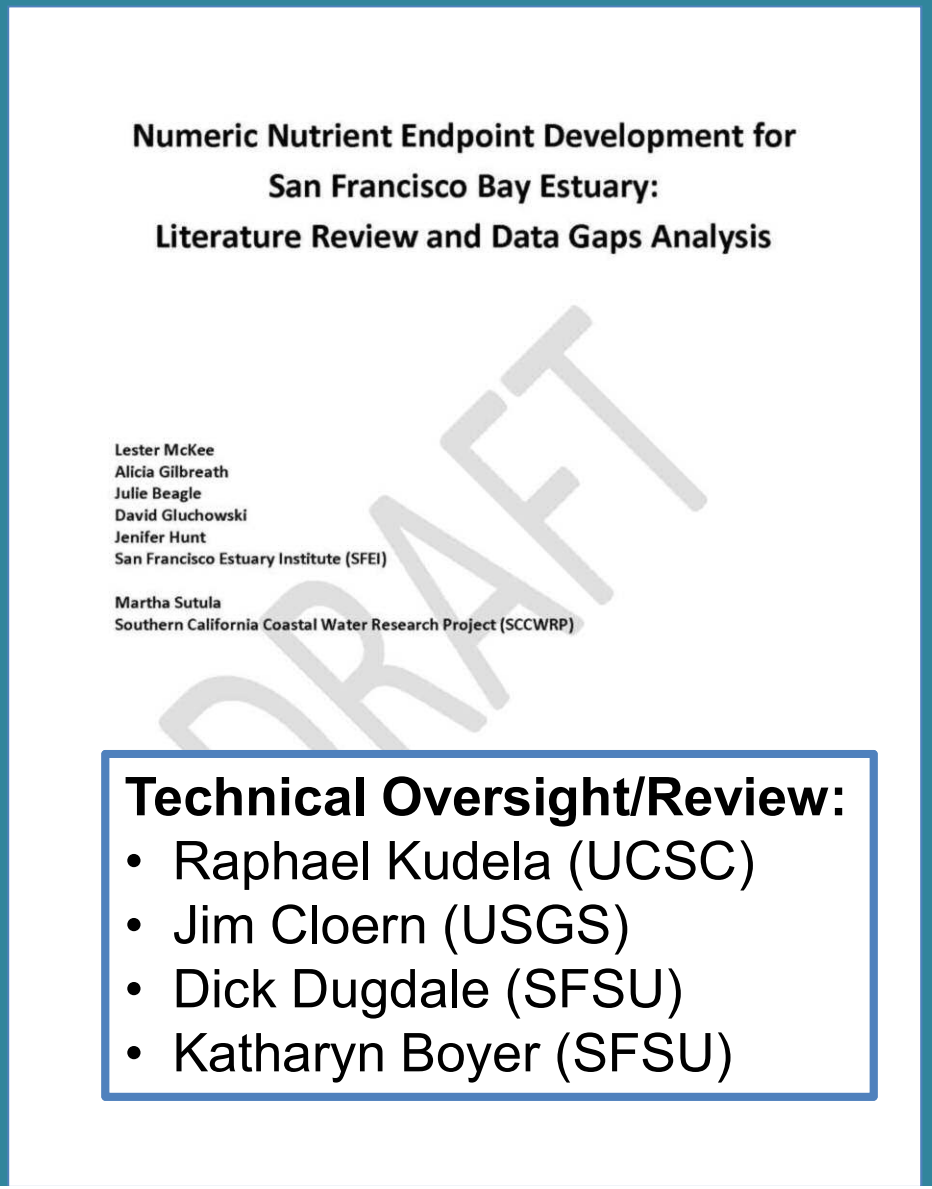
- Lack of consensus on problem definition
- No statewide or regional objectives for N or P
- No locally sponsored nutrient monitoring program
- Complex processes – modeling required
- More science needed to inform management
- Delta considerations

Key Management Questions

- Is there a problem?
- What are appropriate guidelines for identifying a nutrient –related problem?
- Which sources, pathways and processes are most important?
- What nutrient loads can be assimilated without impairment of beneficial uses?
- What is the likelihood that the Bay will be impaired by nutrient overenrichment/eutrophication in the future?

Synthesize Knowledge
NNE Literature Review - Data Gaps

- Recommends a suite of indicators to assess eutrophication/nutrient overenrichment
- Assesses data availability and status/ trends in eutrophication using these indicators
- Evaluates data available to assess nutrient loads
- Summarizes data gaps and recommended next steps



Technical Oversight/Review:
- Raphael Kudela (UCSC)
- Jim Cloern (USGS)
- Dick Dugdale (SFSU)
- Katharyn Boyer (SFSU)

Approach for Development of Nutrient Objectives

- Narrative objective, with numeric guidance
  - Guidance coined as " Nutrient Numeric Endpoint or NNE"
- Diagnosis based on response indicators = NNE Assessment Framework
  - Assessing eutrophication and adverse effects of nutrients
  - Multiple lines of evidence for more robust diagnosis

Algae and Aquatic Plants

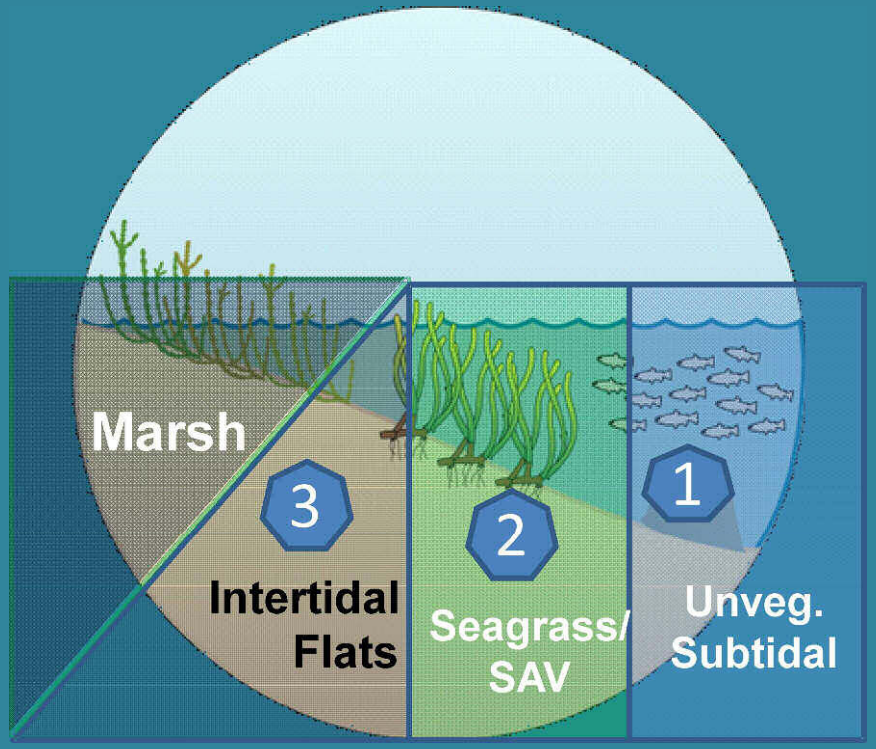
Dissolved Oxygen, pH

San Francisco Bay Narrative Objective

- *"Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll-a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances.*

  Irregular and extreme levels of chlorophyll-a or phytoplankton blooms may indicate exceedance of this objective and require investigation."

Habitat Types Under Consideration for SF Bay



Include:

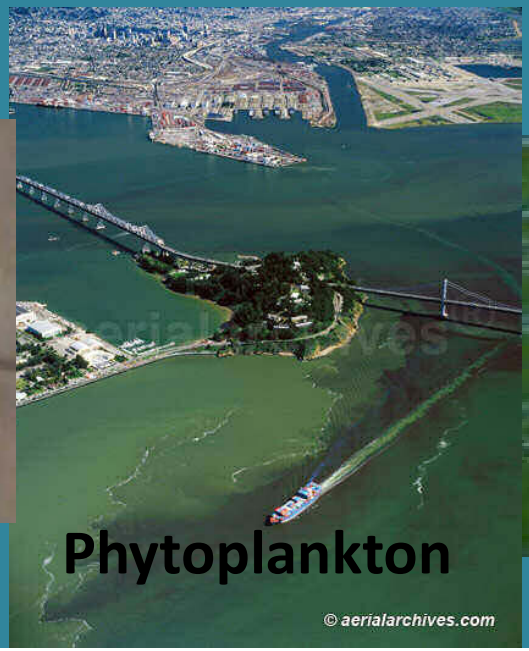
- Unvegetated subtidal
- Seagrass - submerged aquatic vegetation
- Intertidal flats
- Managed ponds

Exclude:

- Emergent marsh

Recommended Indicators : All Subtidal Habitat

Primary Indicators	Secondary Indicators
Phytoplankton Biomass, Productivity, and Taxonomic Composition Cyanobacteria cell counts and toxin concentration Dissolved oxygen	Water column nutrient concentrations and forms (e.g. ammonium) Other HAB species cell counts and toxin concentrations



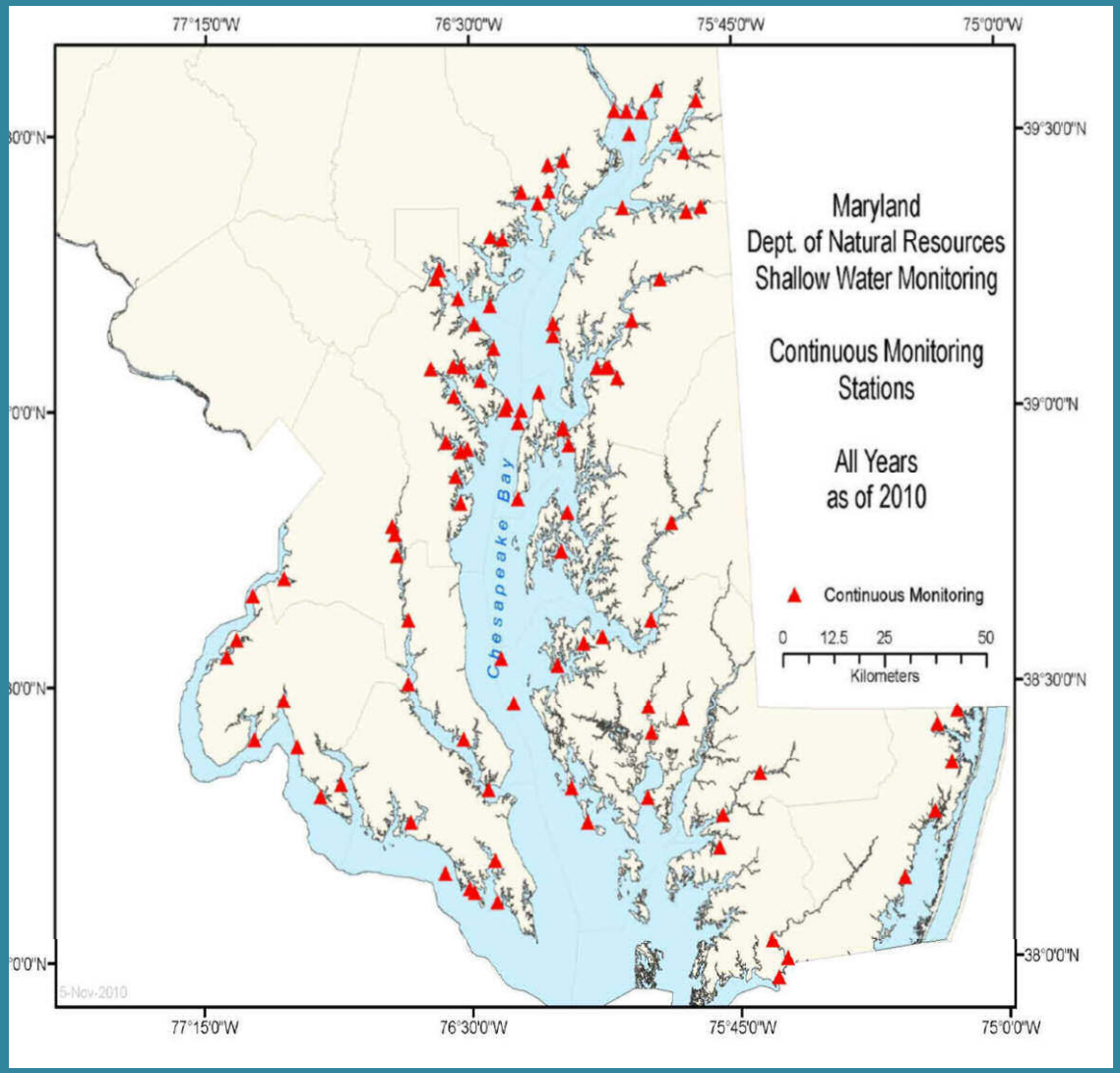
Recommended Indicators: Seagrass & Brackish Submerged Aquatic Vegetation

Primary Indicators	Secondary Indicators
Phytoplankton Biomass Macroalgal Biomass and Cover	Light attenuation Seagrass areal distribution and density Epiphyte load

Locally Sponsored Monitoring

- **Walt's Words of Wisdom**
  - Think broadly regarding measurement variables...ecology is complicated
  - One MONITORING SYSTEM will NOT be sufficient for all time and space scales
  - Monitoring needs to be long-term
- Leverage USGS research program
- Coordinate efforts (IEP, DFG)
- Focus on funding

Monitoring in Shallow Water Habitat

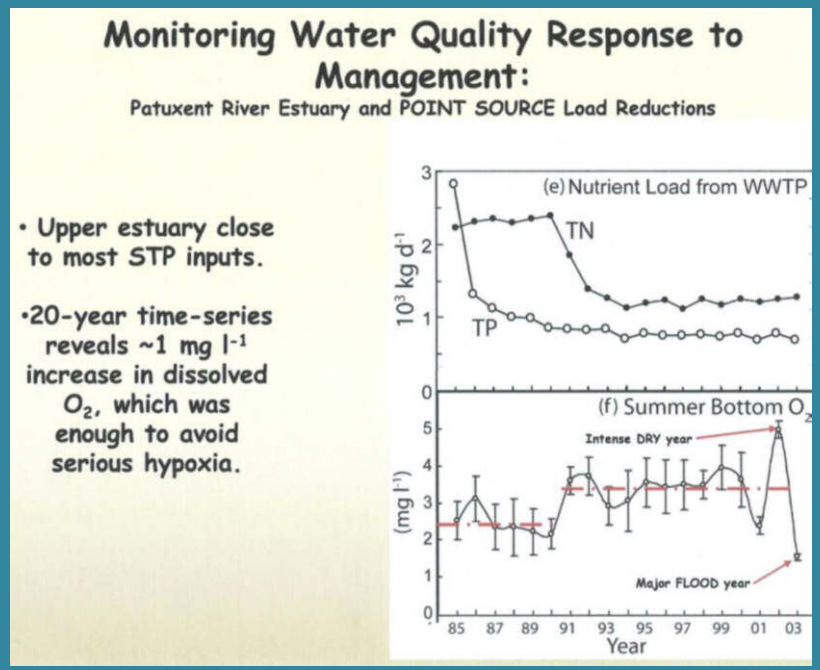


- Chesapeake Bay
- New Monitoring Methods
  - Focused on shallow water habitat (SAV)
- High frequency measurements (15 minutes; Apr – Oct)

Focusing on Shallows in San Francisco Bay

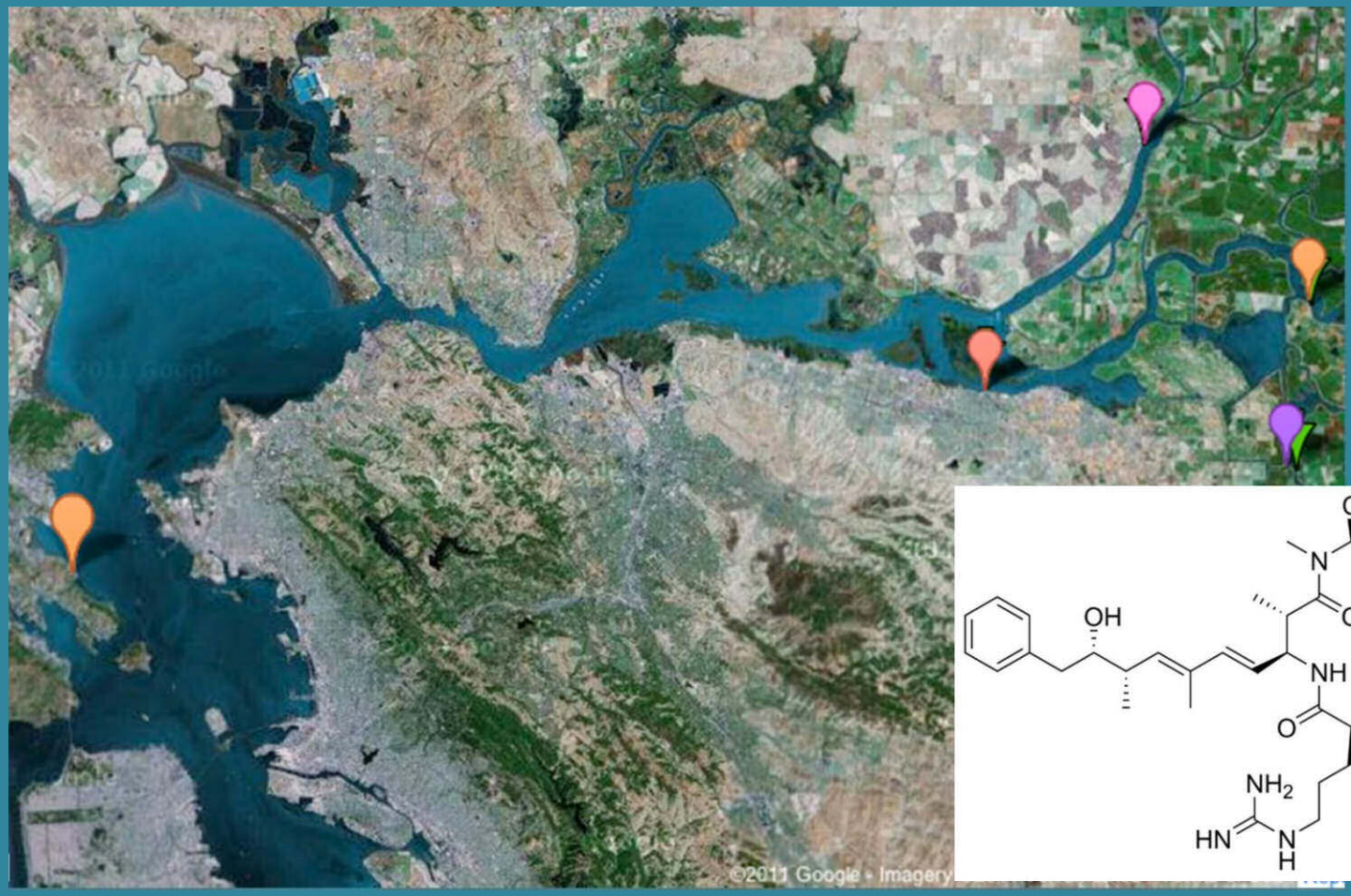
- Subtidal Goals Project
- GIS maps of subtidal habitats
  - — Eelgrass Beds
  - — Oysters
- South Bay – low DO concerns

Is There a Need for Management Actions to Control SF Bay Loads?



- Walt's Chesapeake Bay example
- Assess control measures for sources
  - Look at cost, effectiveness, limits of technologies
  - Other policies: recycled water, Delta flows, wetland reuse
- Load-Response Models
  - Link response indicators to nutrients and co-factors

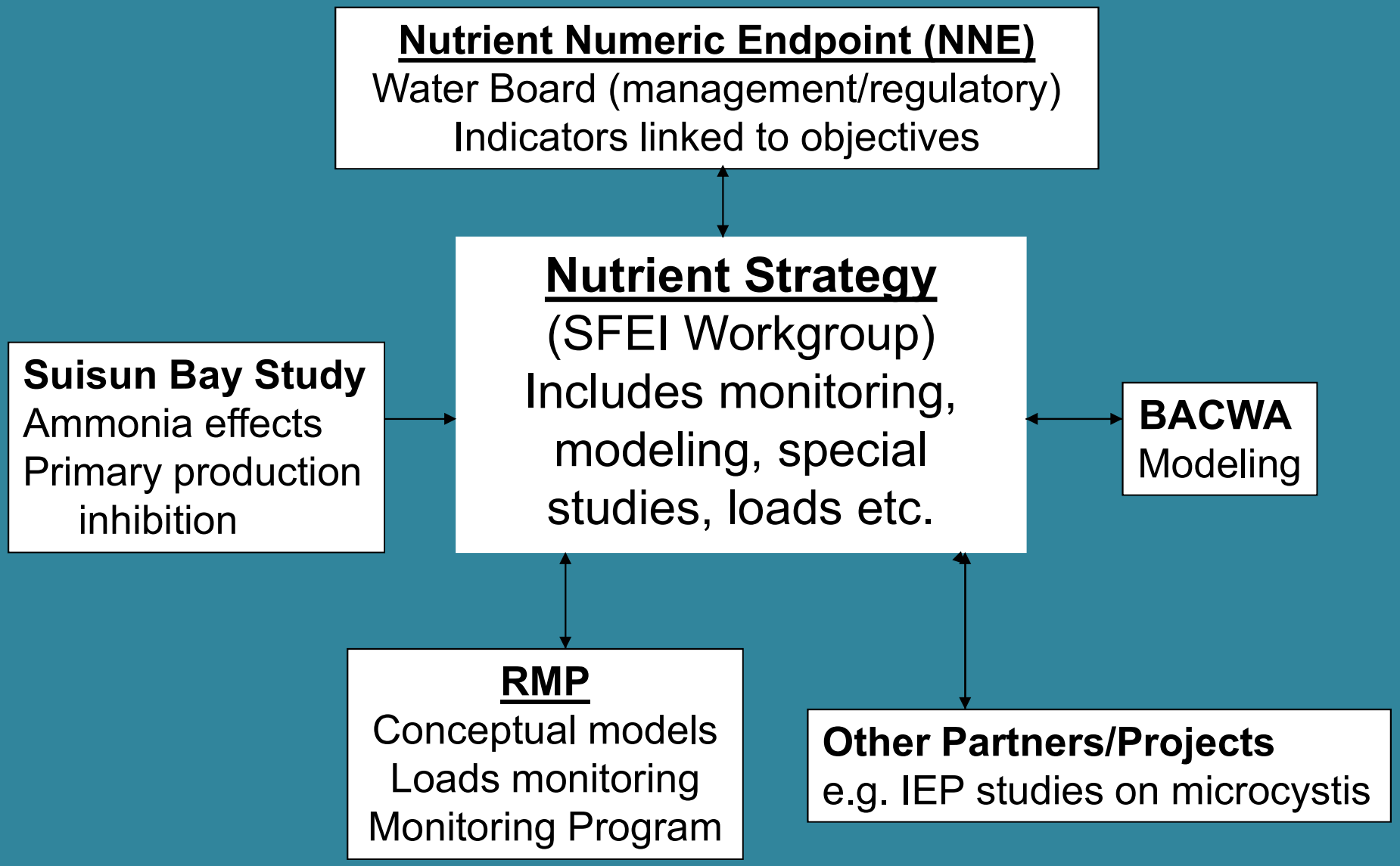
More Science Needed Microcystins: An Emerging Threat?



Other Nutrient Management Actions

- Statewide Policy for Nutrient Control in Inland Surface Waters
  - CEQA scoping meeting – October 27, 2011 at CalEPA
- TMDLS for nutrients – Napa River and Sonoma Creek
  - Under development (completion planned for 2013)
  - Data collection - using SWAMP protocols to assess macroalgal endpoint
  - Will rely on implementation required for pathogen and sediment by adopted TMDLs
  - Discharge prohibitions during dry season due to lack of dilution

Concept of SF Bay Nutrient Strategy
Work in progress



Key is Collaboration