


POTWs Role in the Nutrient Management Strategy for San Francisco Bay

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Overview

- Background
- SF Bay's Nutrients Status
- SF Bay Nutrient Management Strategy (NMS)
- Watershed Permit Approach
- BACWA/POTW's Role in the NMS
- Future Direction of the NMS Regarding POTWs

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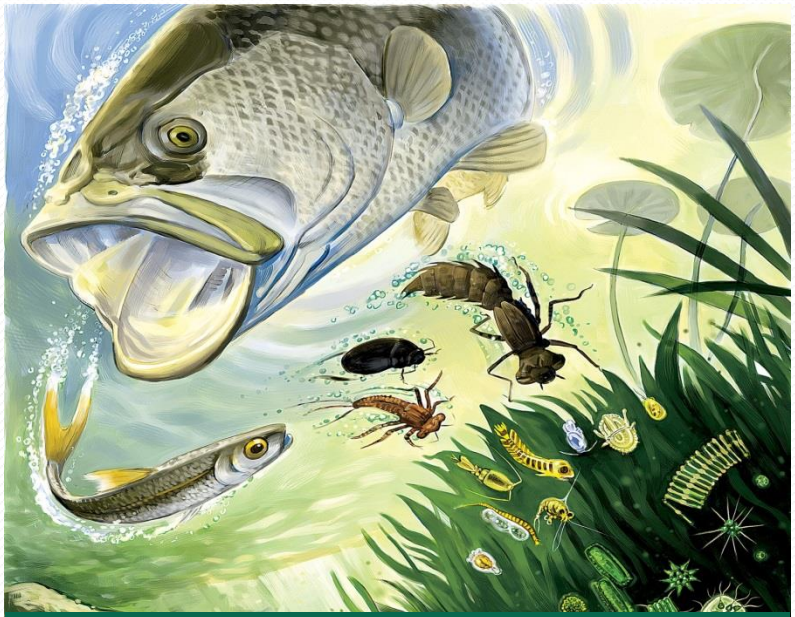
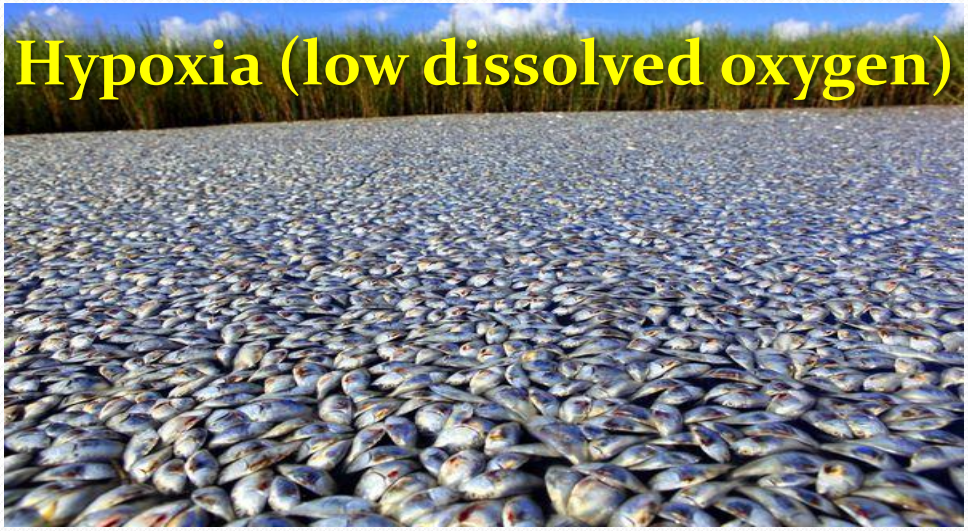
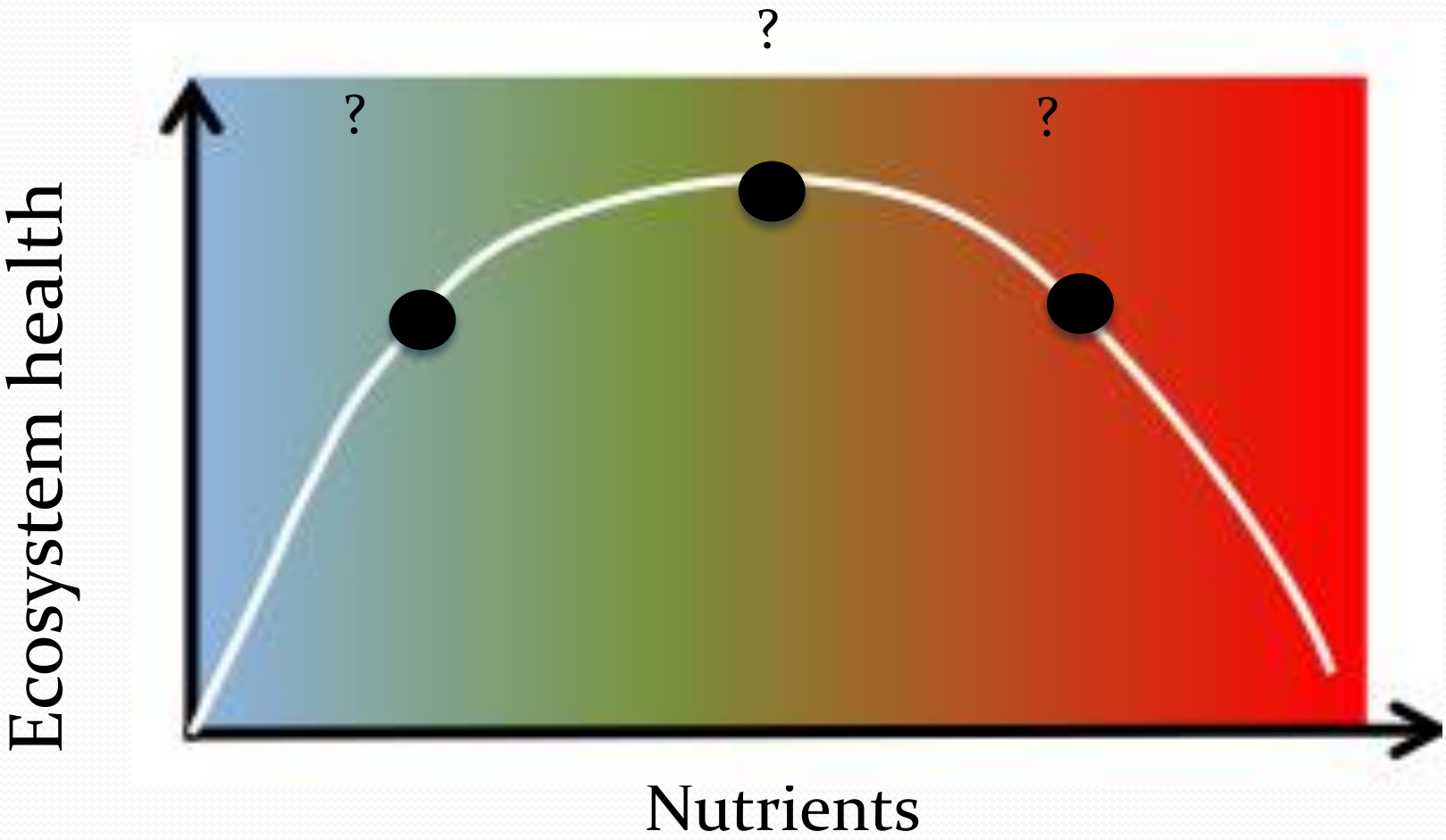
Why the concern about nutrients?

- Potential Environmental Impacts of Nitrogen and Phosphorus

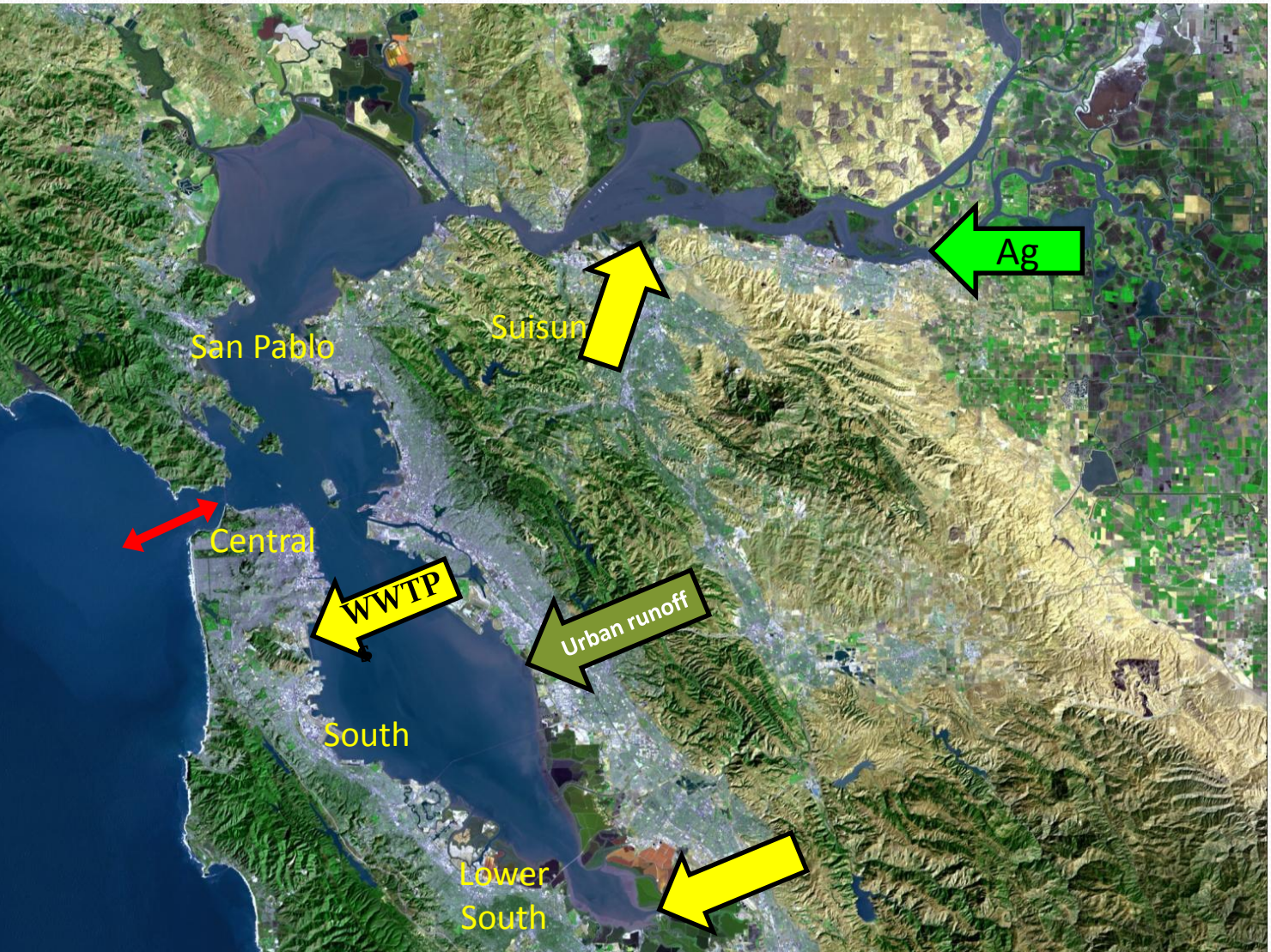




Nutrient Impact Bi-Modal

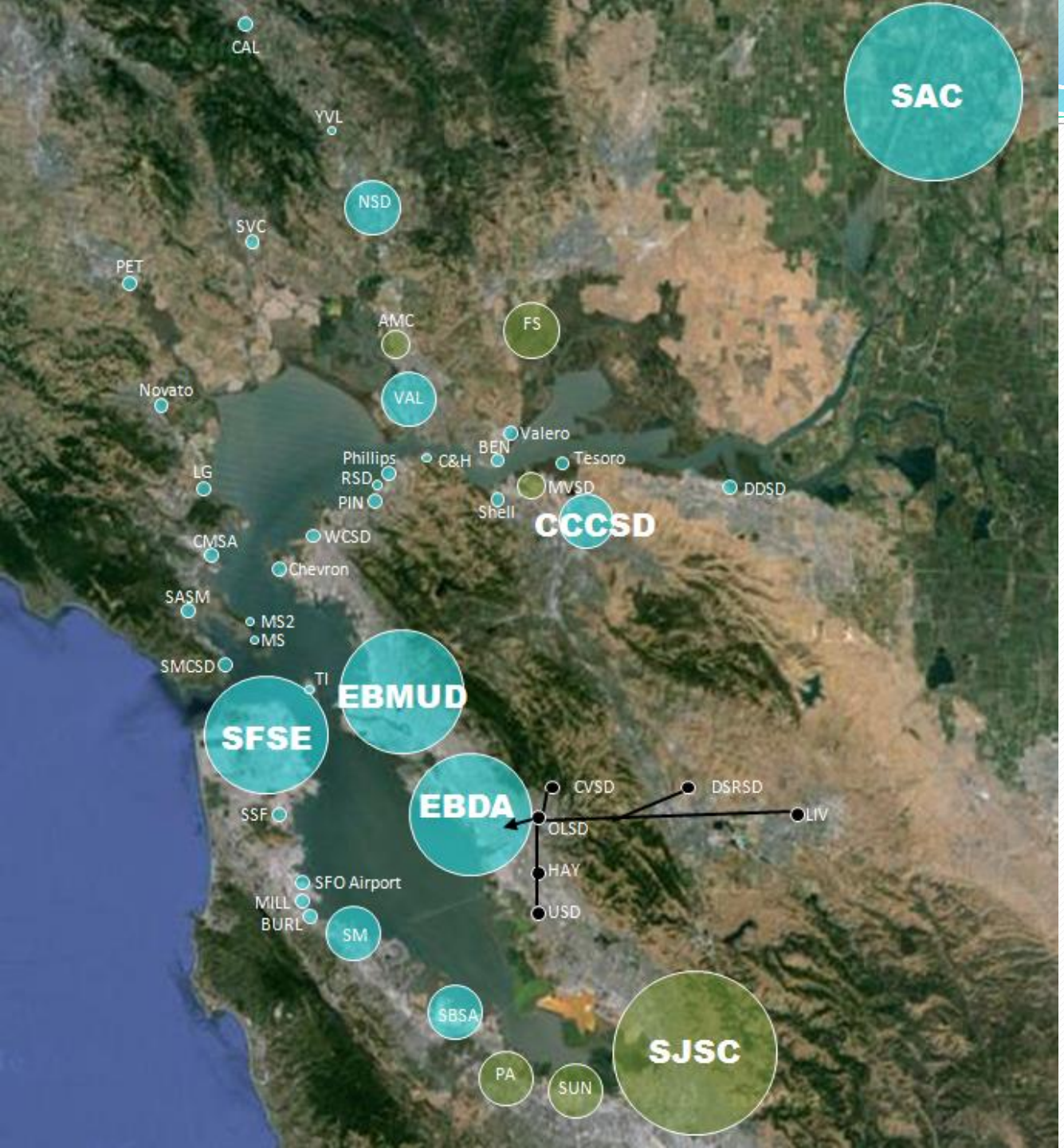


Many Sources of SF Bay Nutrients



- 42 WWTPs
- About 60% of N/P loads
- 80-85% South Bay

SF Bay Wastewater Discharges



Flow MGD	Secondary Treatment	Ammonia Removal
<1		
1-10		
10-50		
50-75		
75-100		

Ammonia Loads to Bay

NH_3 Load (kg/d)	Secondary Treatment	Ammonia Removal
<100		
100-1,000		
1,000-5,000		
5,000-10,000		

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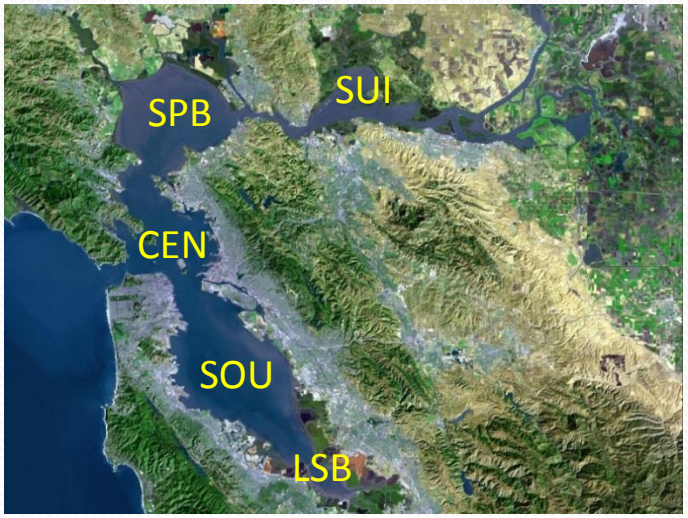
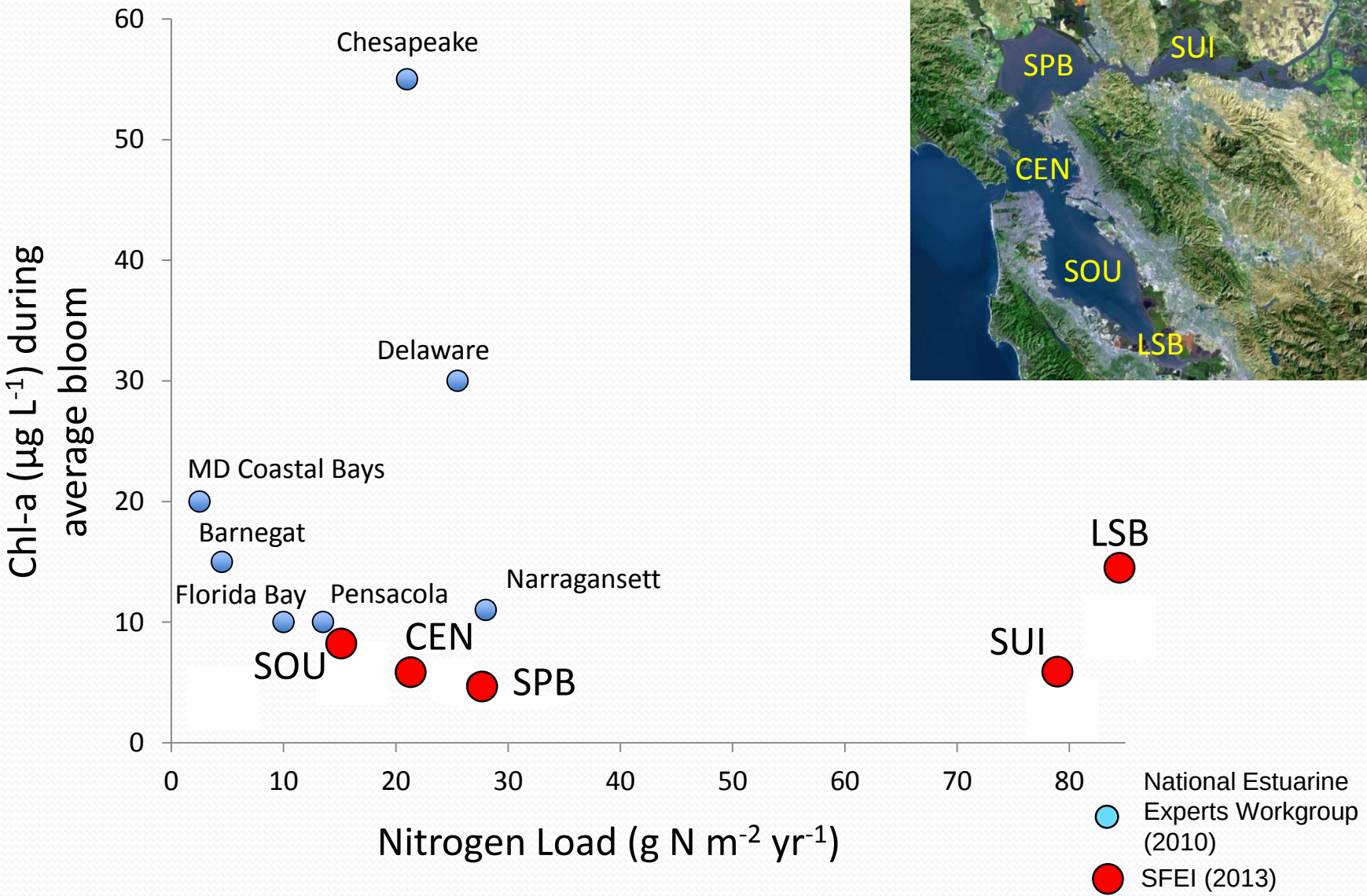
High Nitrogen loads, but low impacts





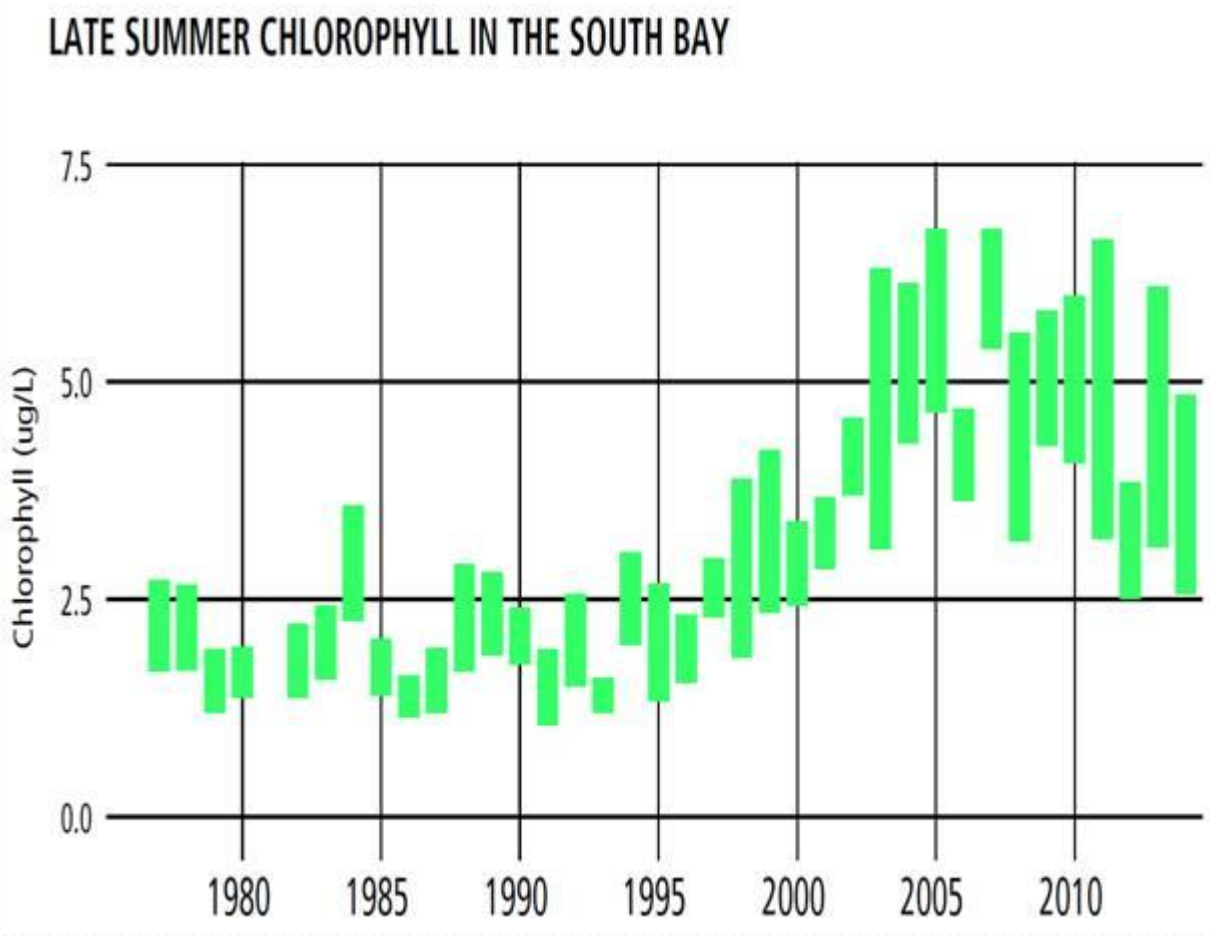
Why has SF Bay been nutrient-resilient?

- High turbidity reduces light penetration
- Strong tidal mixing mixes plankton to darker water
- Filter-feeding clams reduce phytoplankton

BUT

- Turbidity declining (dams trapping sediments)
- Clam populations declining (fish grazing)

Ecosystem Response Changing in SF Bay



Have Recent Increases in Chl-a Plateaued and Now Declining?

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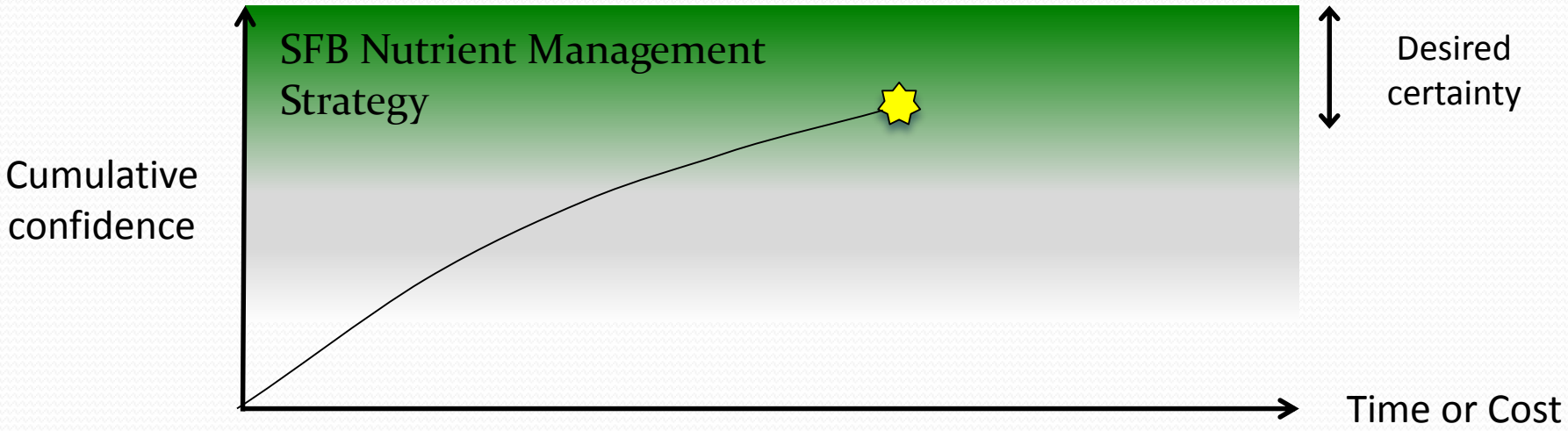
SF Bay Nutrient Management Strategy

- Collaborative process using the site-specific complexity of the watershed
- Regulatory mandates based on scientific monitoring, modeling and assessment.
- Science decisions guided by a multi-stakeholder steering committee.

Nutrients Science Focus

- What constitutes impairment? Which areas are impaired?
- Does SFB's trajectory signal future impairment?
- What nutrient load reductions are needed? Where, how much?
- How much time for science, planning, and implementation?



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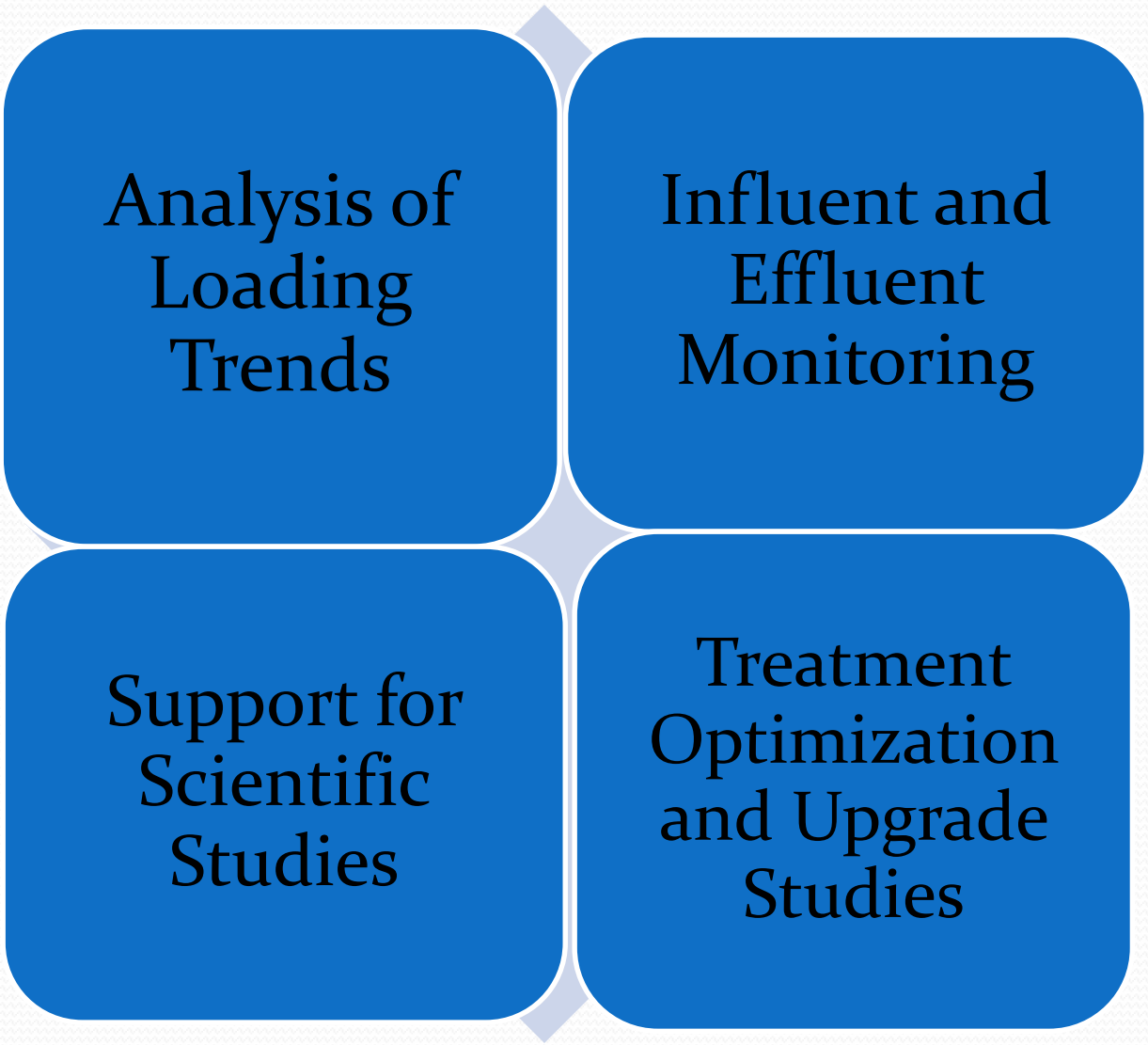
BACWA Supported the Watershed Permit

- Science based effort to investigate if problem exists
- Recognizes the consequence of premature conservative regulations
  - Huge financial strain to the region
  - Large energy demand
  - Increase in GHG
- Employs a watershed approach to a regional water issue
- Collaboration among wastewater utilities benefits all their rate payers

Watershed Permit Concept



Nutrient Watershed Permit

- Adopted April 14, 2014, 5 year permit
- Identified 37 major (> 1 mgd) and 2 minor (< 1 mgd) POTWs
- Permit Required:
  - Funding the science needed to address the nutrient questions ($880/yr.)
  - Monitoring
  - POTW evaluation of optimization and upgrades to reduce nutrient loadings to the Bay
  - Annual Report analyzing loading trends

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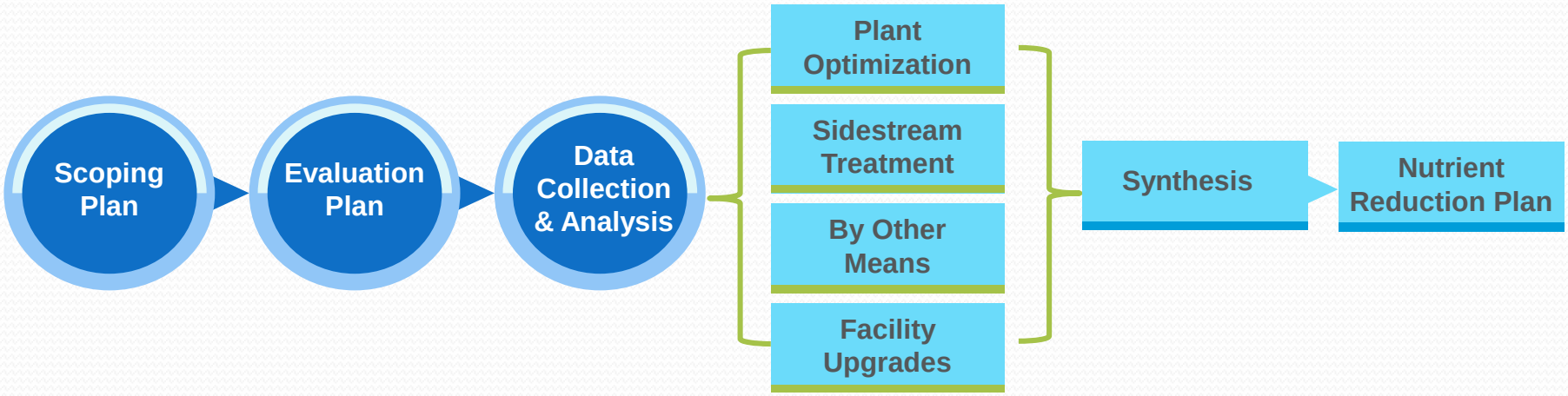
BACWA's Role in the NMS and Meeting Permit Requirements

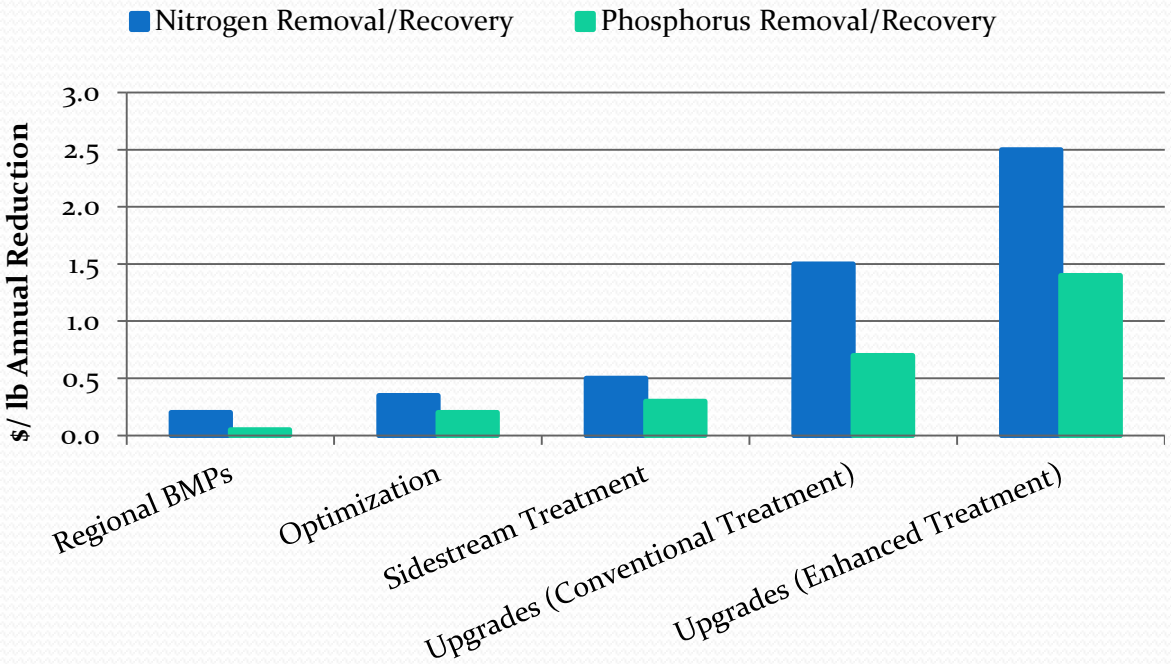
- Instrumental in forming a NMS stakeholder governance group
- Represents POTWs views on the NMS
- Serves as the regional entity to ensure permits requirements are met:
  - Collects the funds from Bay Area POTWs to fund scientific studies
  - Preparation of the Annual Trending Report starting in 2015
  - Overseeing the preparation of the Optimization/Upgrade studies

Optimization and Upgrade Studies of Bay Area POTWs

- Provides insight into the feasibility and costs for reducing nutrient loadings to the Bay
- Investigates how to optimize plants for nutrient removal utilizing existing facilities
- Examines what further reductions in nutrients could be achieved by upgrading plants using proven technologies.
- Reviews other means for reducing nutrient loads

Optimization/Upgrade Workflow



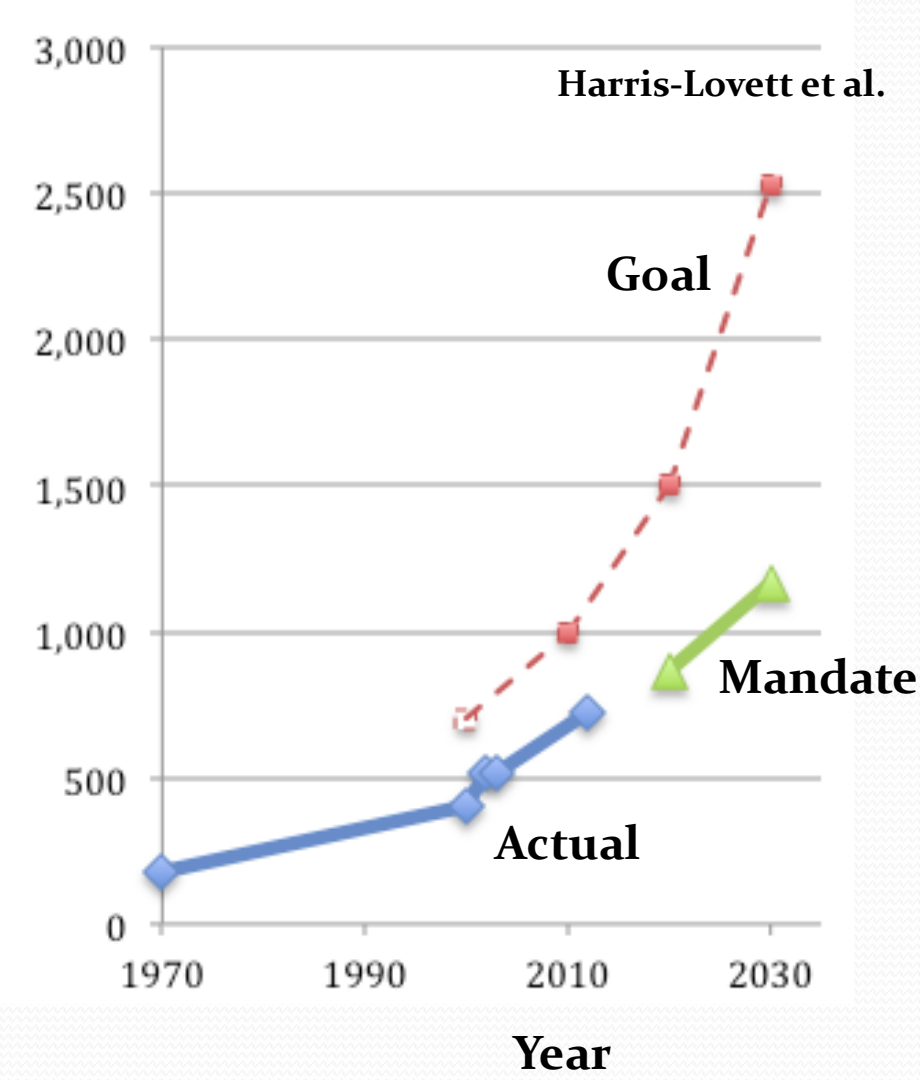


Nutrient Reduction by Other Means

- Wastewater recycling for irrigation
- Using treated wastewater for wetlands creation
- Added benefits
  - creates new drought-proof water supply
  - creates wildlife habitats
  - mitigation of stormwater flows
  - helps sequester carbon

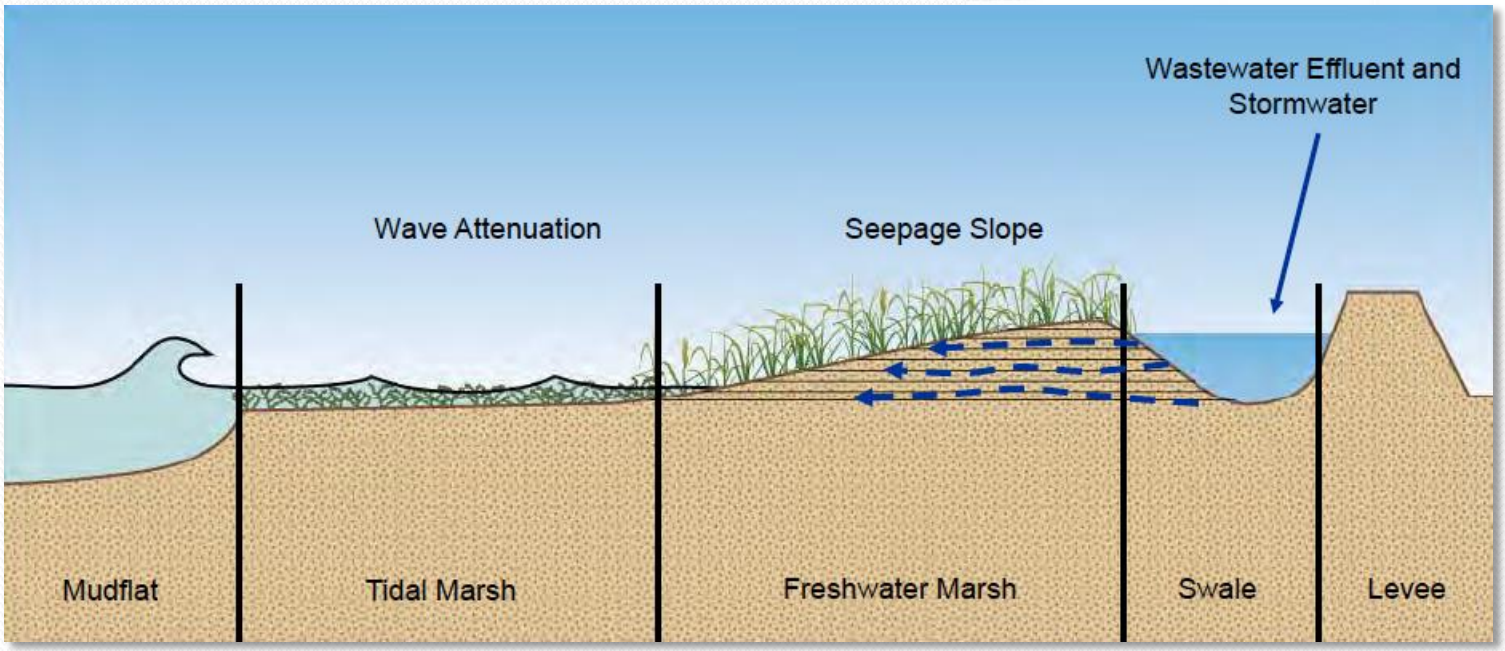
Water Recycling

Goals vs. Actuals



Multi-purpose Wetlands

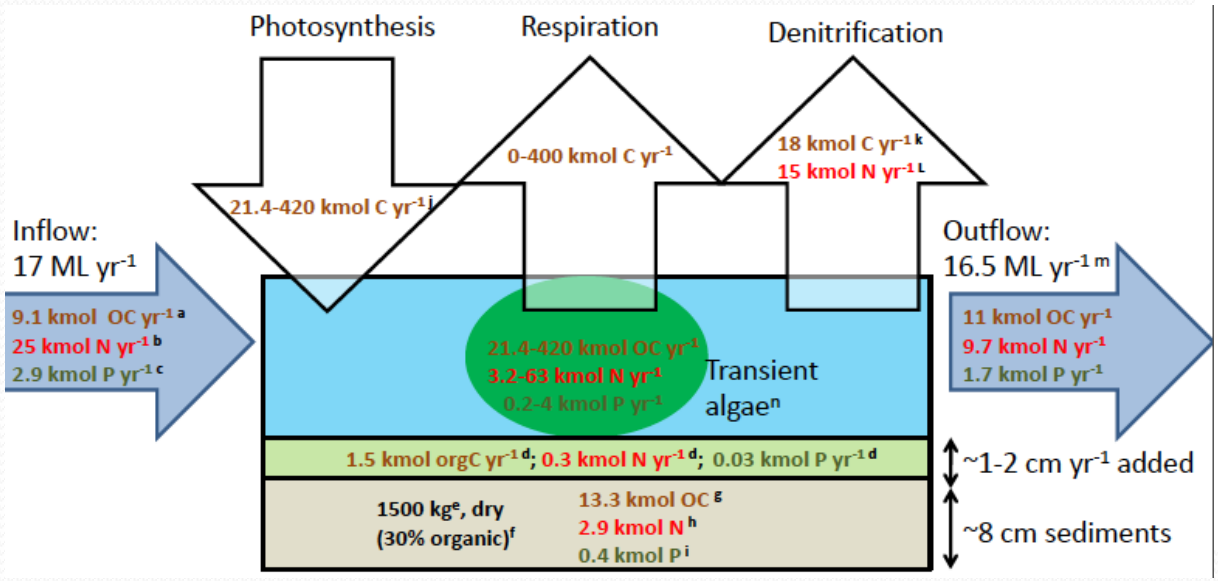
- Nutrient Removal
- Wet Weather Storage
- Ecotone Transition

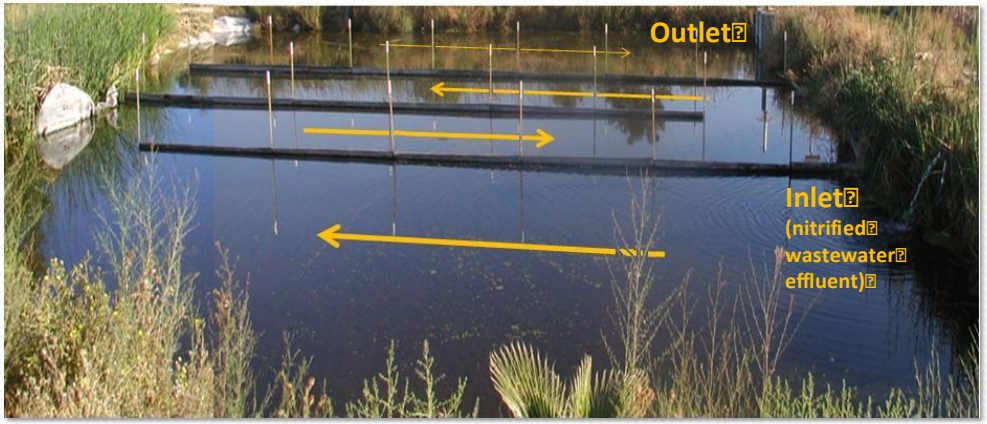


Oro Loma Ecotone Project (ESA/PWA

Wetlands can Sequester Carbon

- Optimization
- Upgrades
- **Wetlands**





Open-Water Test Cell (Discovery Bay)

Prado Wetlands (OCWD)

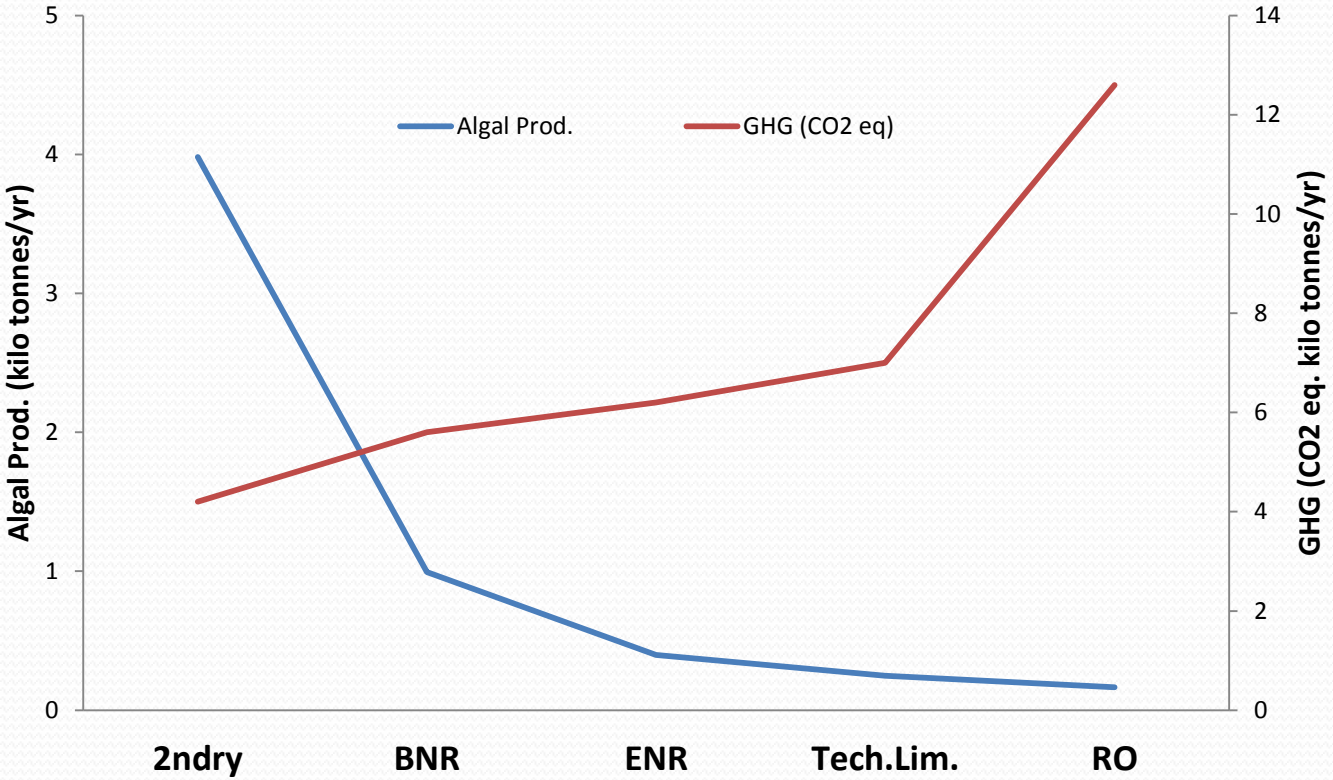
Key Questions/Concerns Moving Forward

- How important are nutrients compared to other water/infrastructure issues?
- The NMS Science Plan is set for 10 years, that is arbitrary and may lead to premature regulatory decisions?
- Treating for nutrients has other undesirable consequences i.e. more energy, more GHGs, more sludge production, more land required.

Key Questions/Concerns Moving Forward (con't)

- What role will monitoring of beneficial uses play in the determination of impairment?
- Given the large number of variables that impact long term trends in the abundance of Chl-a in the Bay, is time on our side to study and observe the trends.
- If management actions are imposed via regulations, how sure are we that they will produce the desired outcomes?

Nutrient Removal Technologies
Trade-off with GHG for 10 MGD plant



TN ppm	30	8	4-8	3	2
TP ppm	2-5	1	0.1-0.3	<0.1	<0.02
Cost ($M)	100	150	180	210	300

Redrawn from Neethling, 2012

Beneficial Uses should be considered in regulatory decisions

- Human Recreation
- Wildlife Habitat
- Commercial & Sport Fishing
- Preservation of Endangered Species

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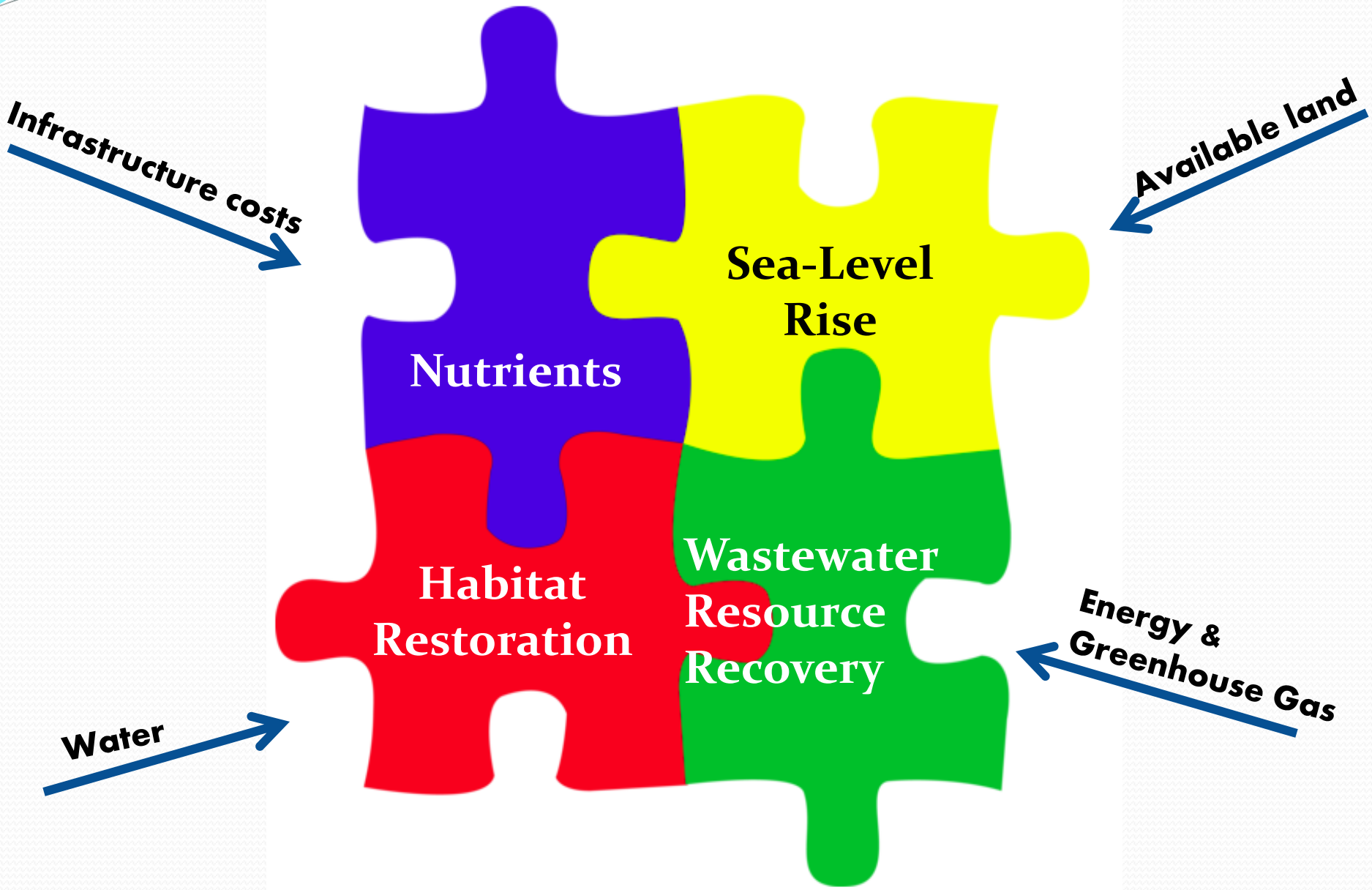
Nutrients are Just One of Bay Issues



BACWA Supports an Integrated Approach Based on Science

- Let science lead the way – avoid premature regulatory decisions
- Science based on monitoring and modeling should be ground-truthed by measurement of beneficial uses
- Any management actions regarding nutrients should be based on integrated regional watershed considerations
  - Climate Change
    - Sea Level Rise
    - Greenhouse Gases
    - Water Reuse
  - Wetlands Restoration

Summary

- **Concerns have been raised regarding the resiliency of the Bay to nutrient loadings.**
- **A watershed permit is in place that helps fund the needed science to determine if the Bay is heading towards impairment.**
- **Studies are underway to determine how best to reduce nutrients, if needed.**

Summary (con't)

- **Treatment upgrades consume limited resources and have unintended consequences.**
- **If needed, a portfolio approach offers several advantages.**
- **Monitoring and modelling results should be checked against actual observations.**
- **Thoughtful approach needed to balance between robust science and early actions.**