


NUTRIENTS IN THE SAN FRANCISCO BAY

Presenter Name
Date
Meeting

Overview

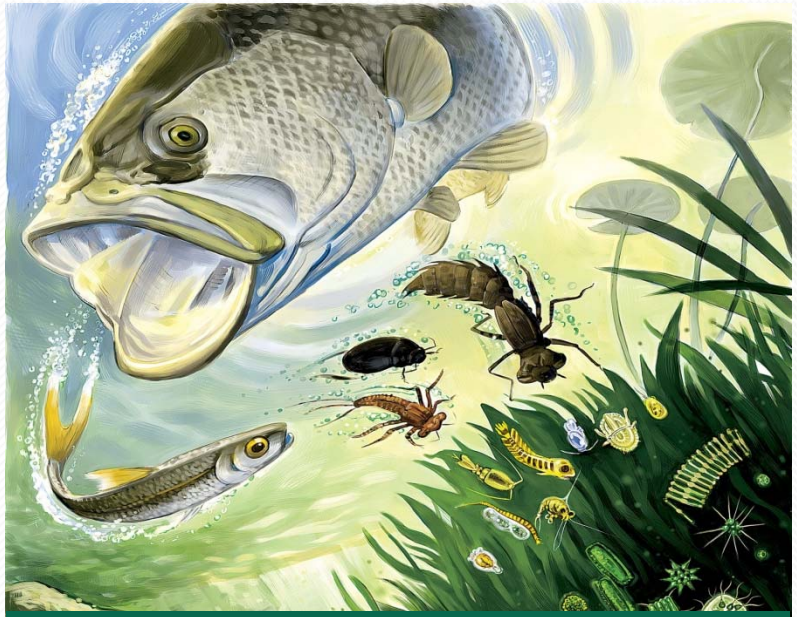
1. Why the concern about nutrients?
2. SF Bay Looks OK - Is it?
3. SF Bay Nutrient Strategy
4. 1st Watershed Permit
5. BACWA's Role
6. Findings to Date
7. Next Steps

Why the concern about nutrients?

- Potential Environmental Impacts of Nitrogen and Phosphorus

Excessive algal growth

Harmful Algal Blooms



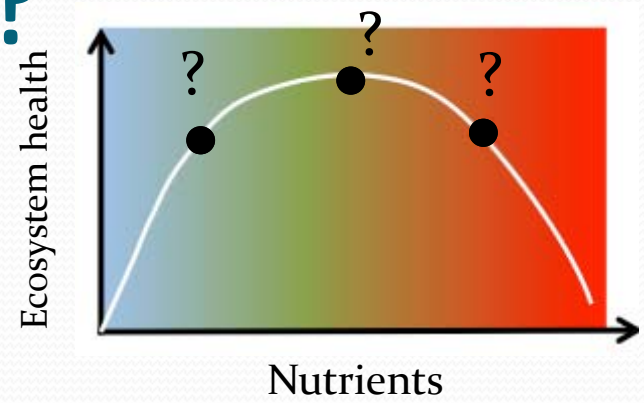
Altered Species Composition

Hypoxia (low dissolved oxygen)

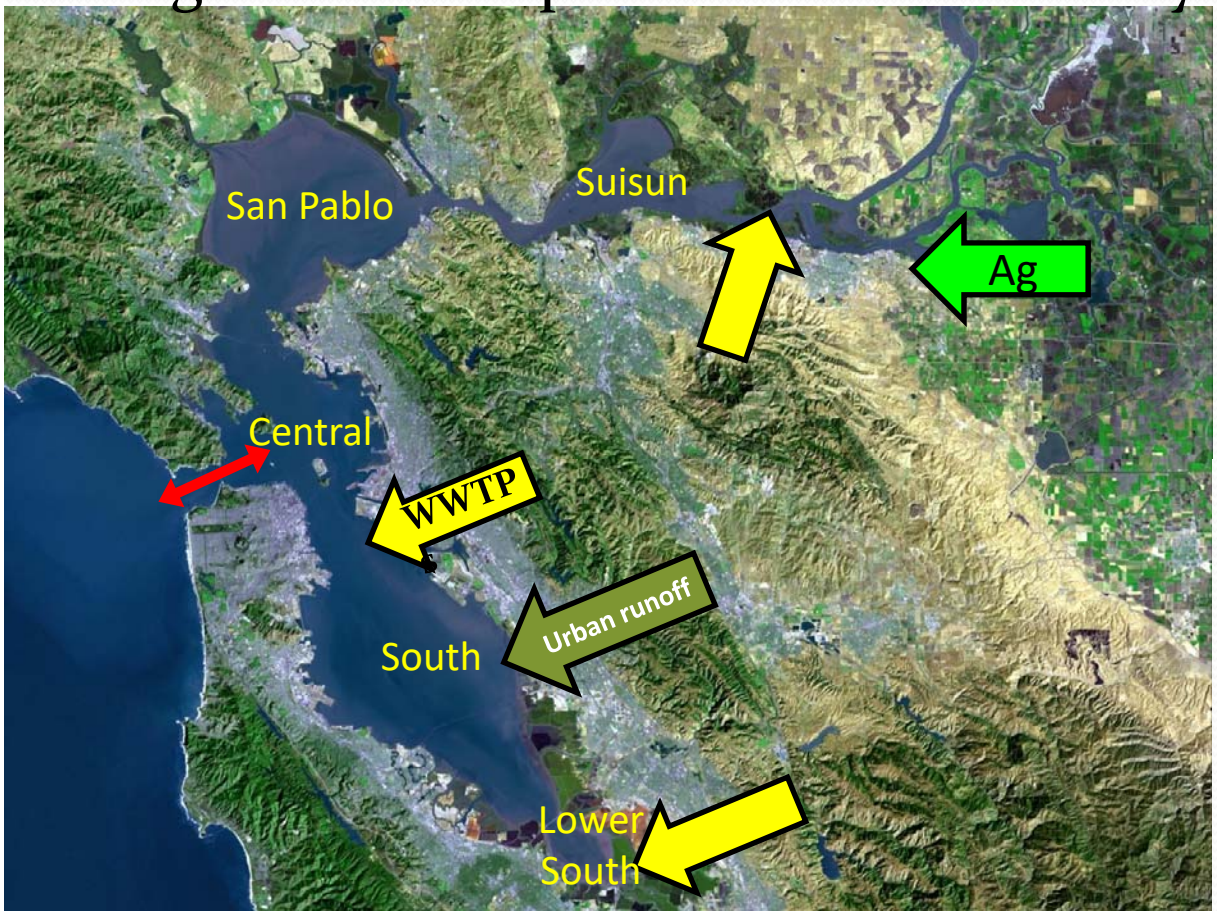
Why the concern about nutrients?

- Regulatory Mandates – Dischargers in other part of the country have been given nutrient limits that are below the limits of technology, based on overly precautionary science.
- High cost to address – Full nitrogen/phosphorus removal could cost up to $10 billion regionally
  - e.g. Nutrient Limits in Sacramento Regional NPDES permit 2010:
    - Ammonia 2.2 mg/L
    - Nitrate 10 mg/L
    - Estimated $1.5 - $2 billion for upgrades

SF Bay looks OK – is it?

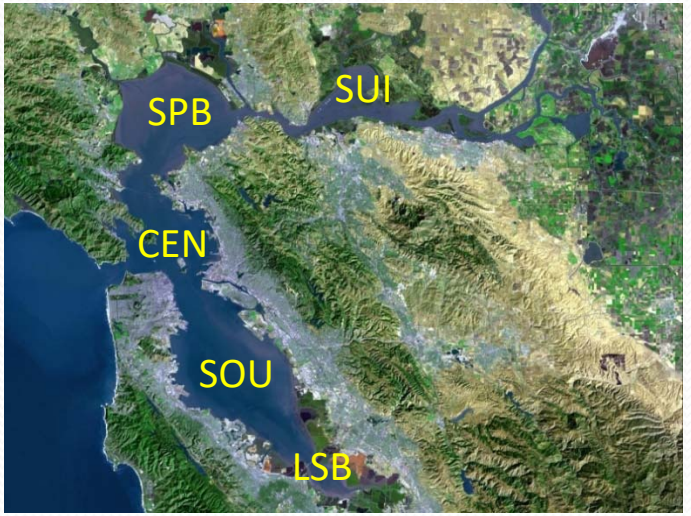


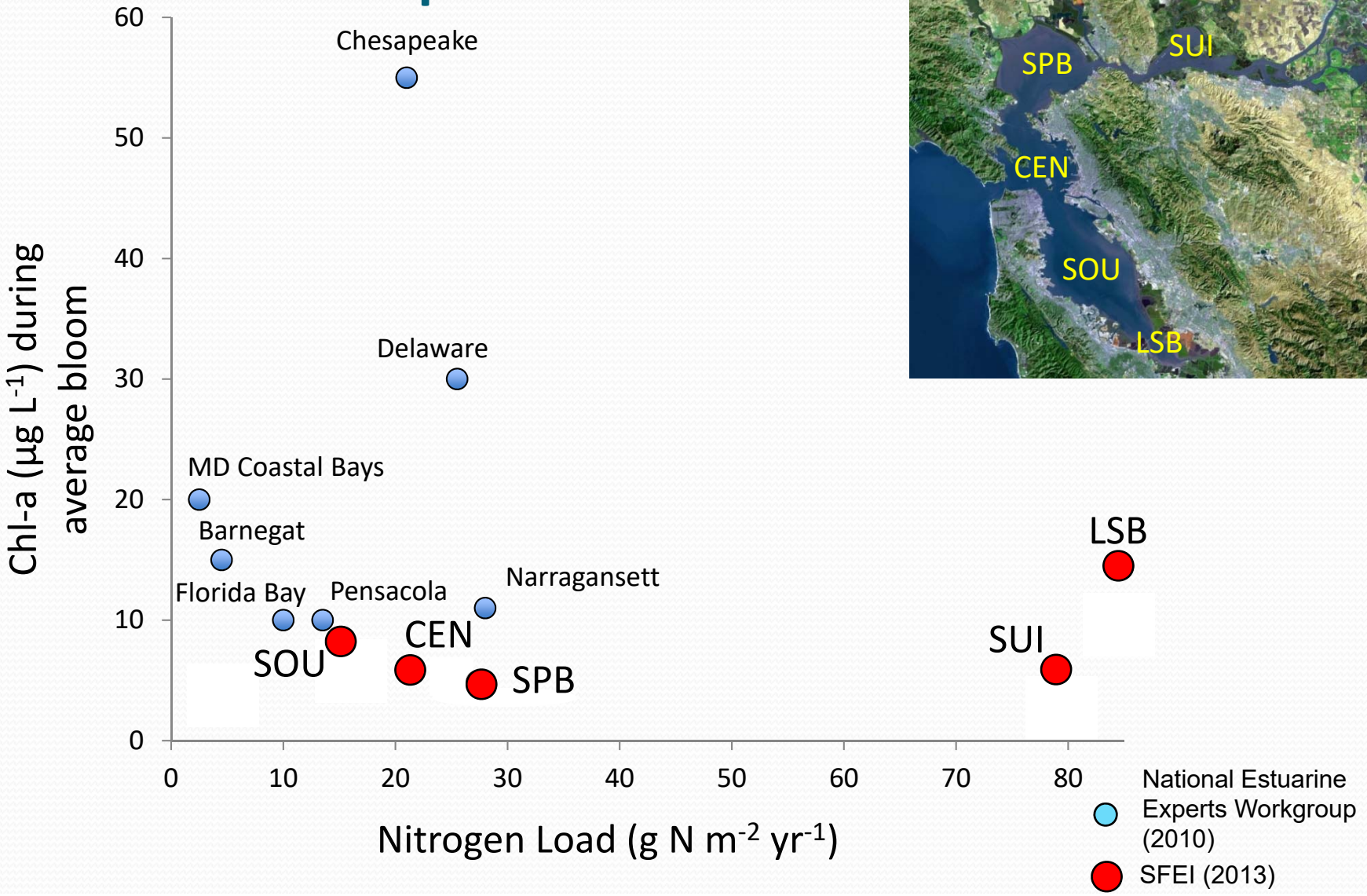
Nitrogen and Phosphorus Loads to the Bay



- Largest CA estuary
- Population = 7.6 M
- 37 WWTPs
- Drains 40% of CA
- Nitrogen and Phosphorus
  - Large loads
  - High concentrations

High Direct Nitrogen loads to SFB, but low impacts





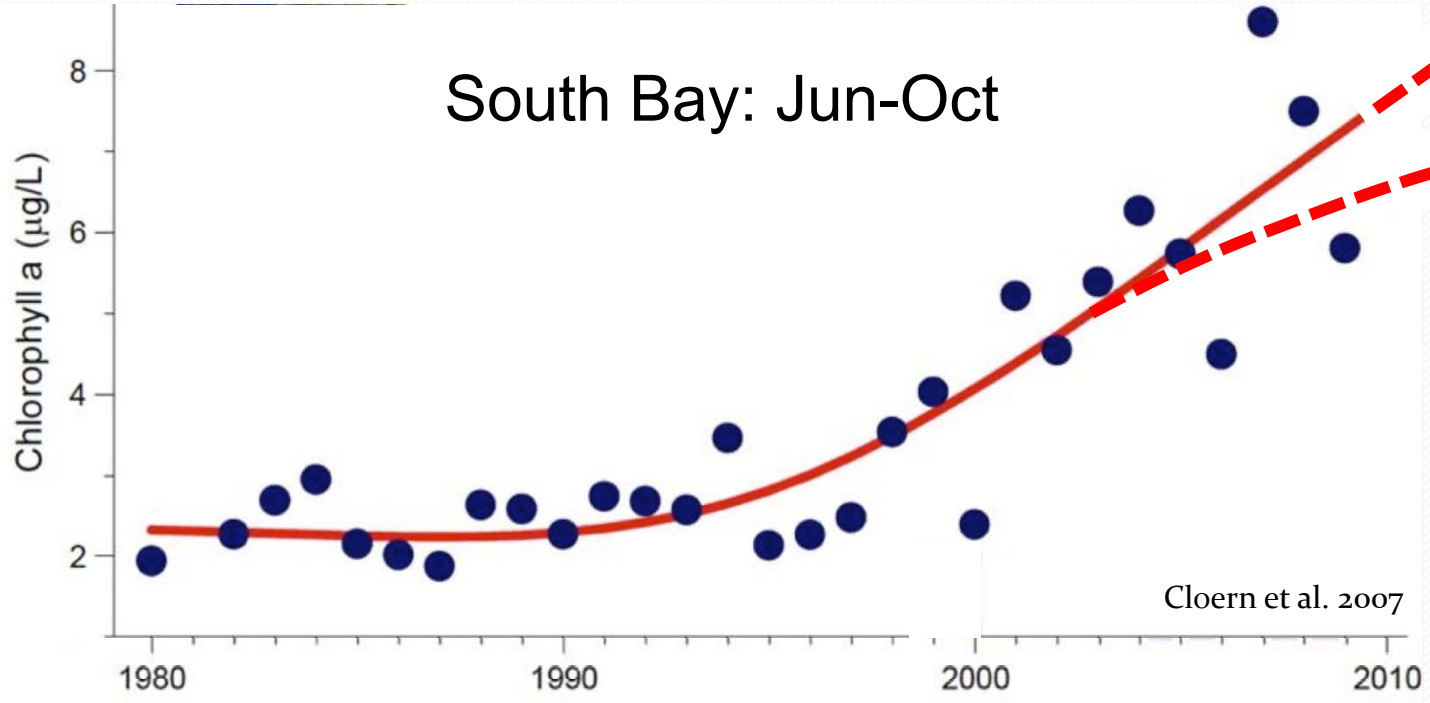
Why has San Francisco Bay been resilient to nutrients?

1. High turbidity blocks the light phytoplankton needs to grow
2. Strong tidal mixing reduces nutrient concentrations
3. Filter-feeding clams reduces phytoplankton concentrations

BUT

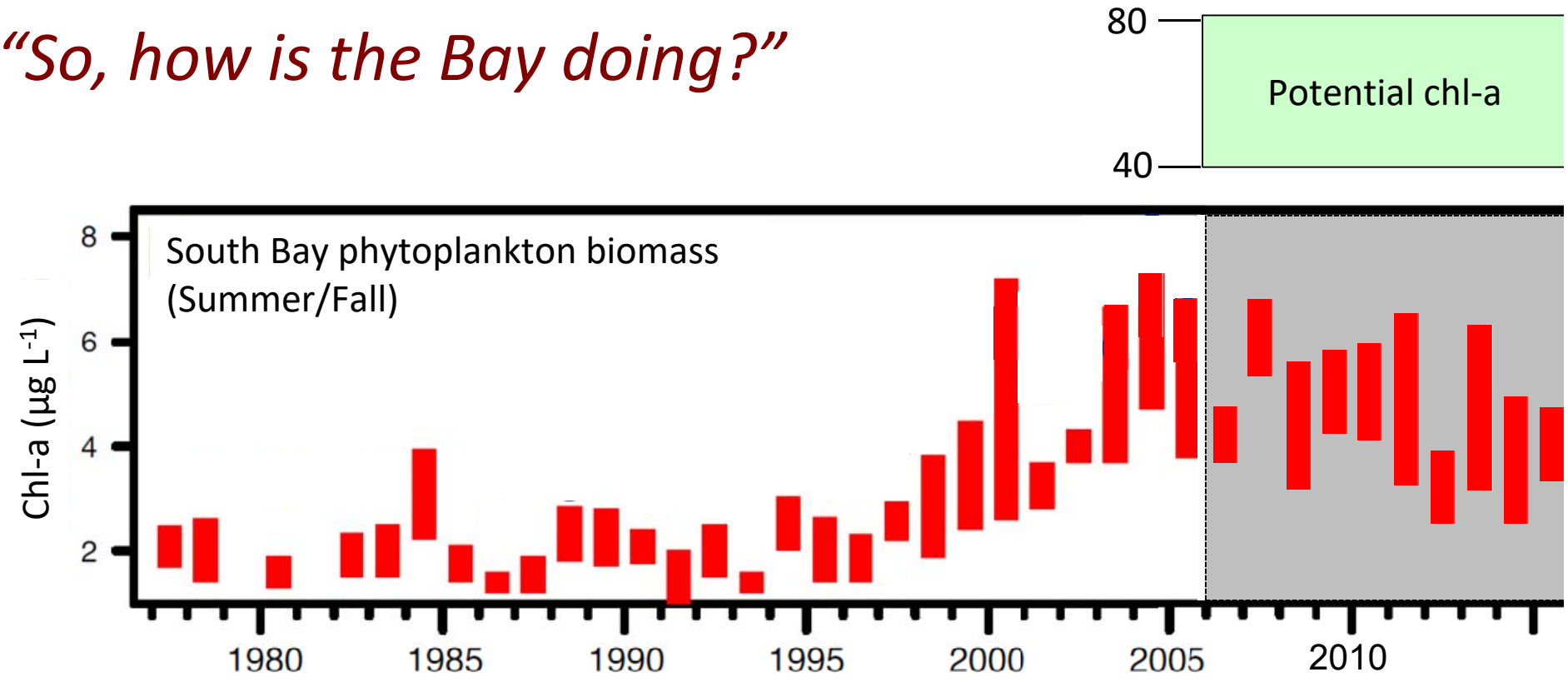
There has been a recent reduction in turbidity due to sediment capture by upstream dams, and clam populations are on the decline.

Ecosystem response is changing in San Francisco Bay (2010)



Will impacts continue to increase, or reach a new plateau?

"So, how is the Bay doing?"



Still changing…

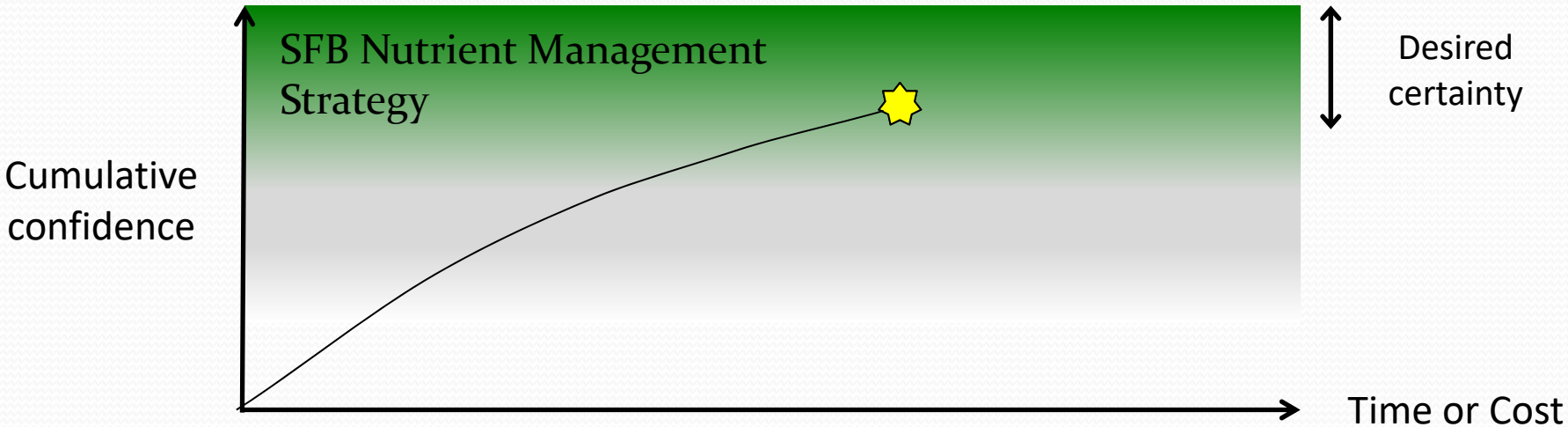
- South Bay and Lower South Bay appear to have reached a new 'state'
  - 2-3x-higher Fall biomass, with unknown cause
- Causes poorly understood…
  - Climate Oscillations (changes in upwelling, coastal currents)
  - Decreased grazing by benthos
  - Decreased suspended sediments

Cloern et al. 2007

Data: USGS
SFEI 2016

The Regional Water Board and POTWs are working collaboratively to answer the following questions:

1. What constitutes impairment? Which areas are impaired?
2. Does SFB's trajectory signal future impairment?
3. What nutrient load reductions are needed? where? how much?
4. How much time for science, planning, and implementation?



Advantages of SF Bay Nutrient Mgmt. Strategy

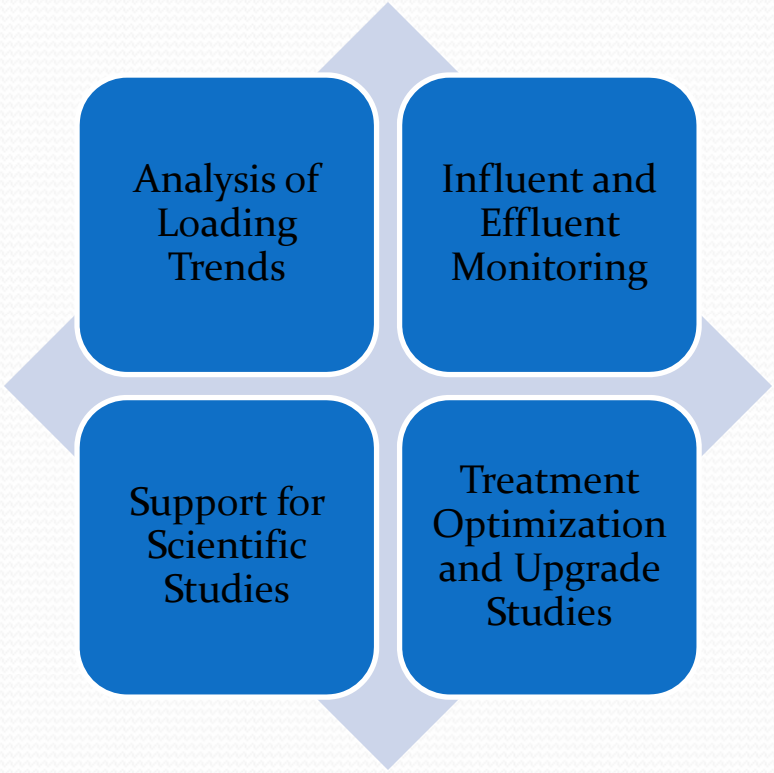
- Unique approach in the U.S. because it is a collaborative process that takes into account the site-specific complexity of the watershed. This is not a one-size-fits-all approach.
- Any eventual regulatory mandates will be based on scientific monitoring, modeling and assessment, and not just conjecture.
- Decisions about what science is needed will be guided by a multi-stakeholder steering committee on which BACWA will have representation.

1st Watershed Permit (2014-19)

- In 2013, the Regional Water Board began to work with BACWA to develop a nutrient watershed permit.
  - Stakeholders don't need to negotiate over nutrients on a permit-by-permit basis
  - Ensures regulatory certainty for dischargers for five years
  - Nutrients are a regional issue and negotiations are best conducted on a regional basis.
- To negotiate the Permit, BACWA convened a nutrient watershed permit negotiating team comprised of representatives of large and small POTWs from each of the five subembayments.

Watershed Permit Tenets

There are four main element of the 2014 Nutrient Watershed Permit:



Future permits may require further contributions to scientific studies, and may seek to control nutrient discharges, depending on the results of these studies.

BACWA's Role

- Both the annual report and the optimization/upgrade studies allow a regional reporting option. BACWA providing the annual report and consulting services to develop the Optimization/Upgrade studies on behalf of all members.
  - More efficient and cost effective option than if each agency prepares its own reports
  - Ensures regional consistency in reporting
  - Conduct of the studies is managed by a team of representatives from participating agencies.

Costs associated with Watershed Permit

- BACWA is funding compliance with the following provisions of the nutrient watershed permit on behalf of its members:
  - Annual reporting
  - Optimization and Upgrade studies
  - Support of scientific studies at $880K per year

- BACWA has implemented a Nutrient Surcharge to ensure that this effort can be sustained through the 5 year permit term.

Nutrient Surcharge

- The nutrient surcharge is funded 2/3 by the five BACWA principal agencies, and 1/3 by the associate members (allocated based on effluent nutrient loads)
- The total Nutrient Surcharge for all agencies is as follows:

  FY 15 - $300K

  FY16 - $600K

  FY17 - $800K

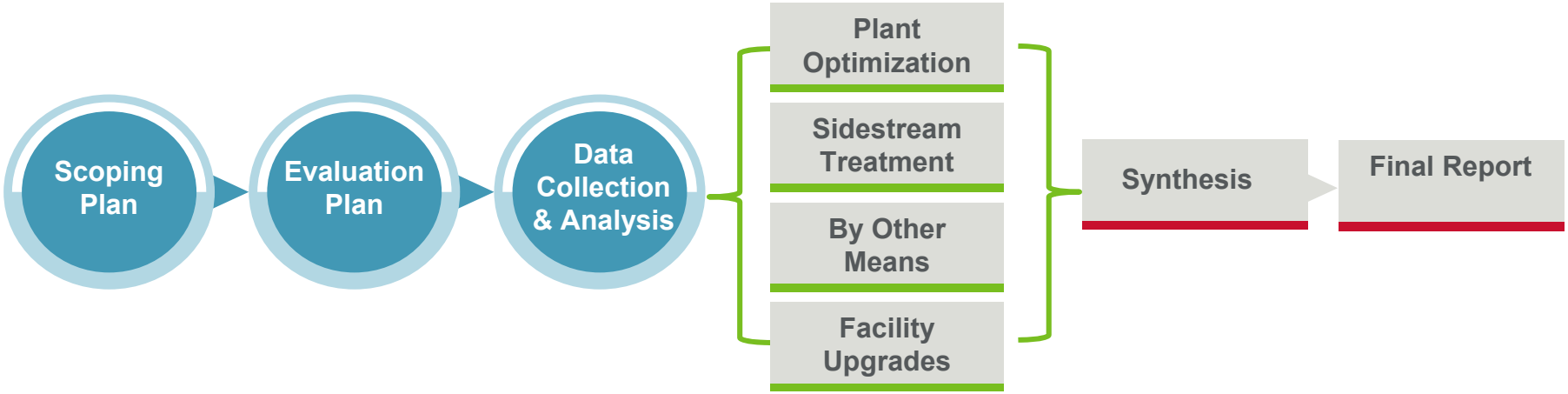
  FY18 - $800K

  FY19 - $800K
- Future charges will be assessed based on what is required when the nutrient watershed permit is reissued in 2019.

FINDINGS

Optimizations/Upgrade Study

Optimization/Upgrade Study



Completed

In progress

Upcoming

Optimization Findings (29 of 37 plants)

Costs

- Total PV costs ranged from $ 0.5 to 28 Mil per plant
- Total PV for the draft 29 plants =
  $171 Mil for Dry and $212 Mil for Wet
- Flow-weighted Total PV unit cost = $0.4/gpd
- Overall Load Reduction from Current Discharge
  - The overall Ammonia/TN load reduction is 10-14%
  - The overall TP load reduction is 45-50%

Upgrade Findings (29 of 37 POTWs)

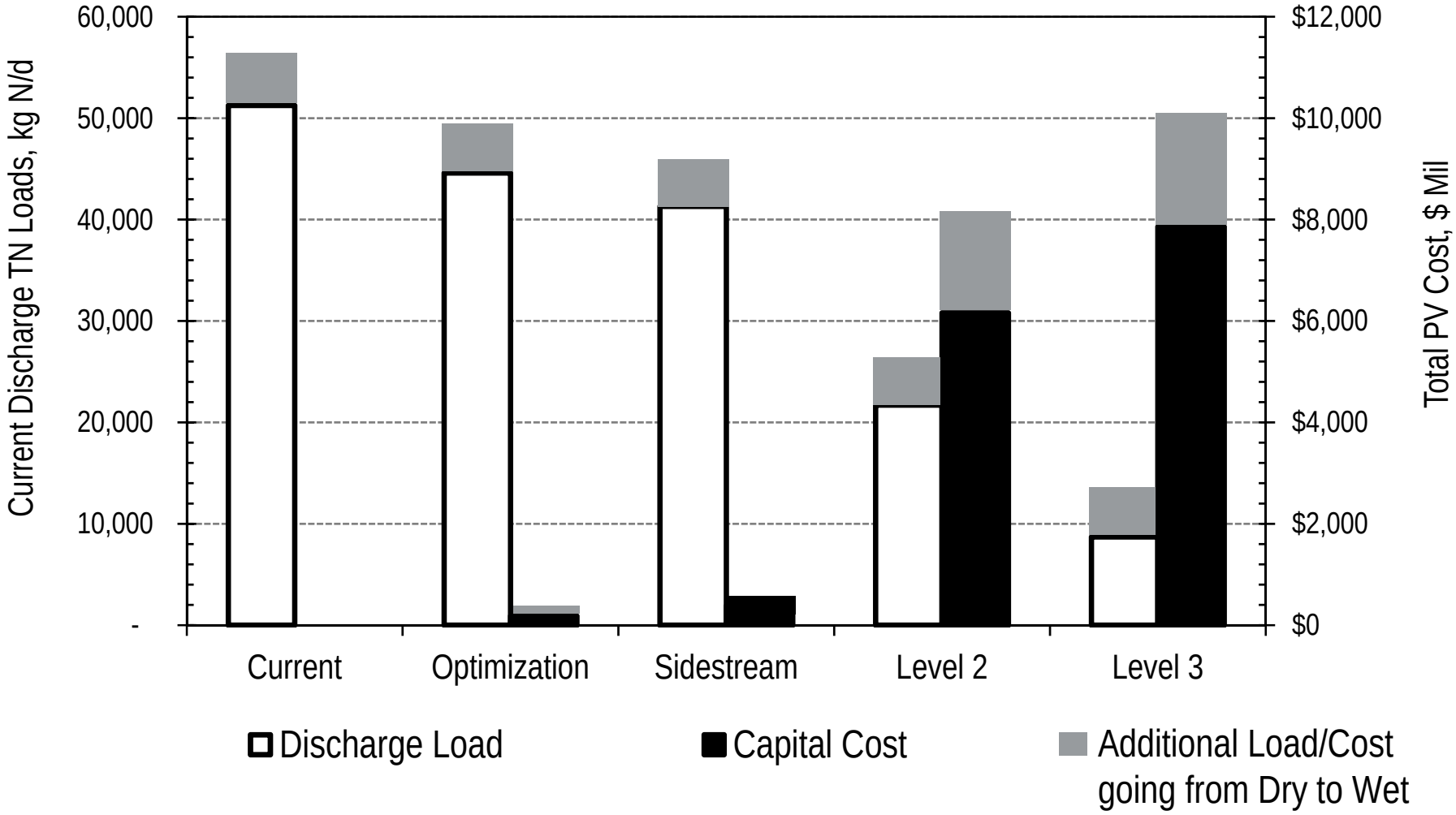
Costs

- Total PV Costs
  - Level 2 = $5,575 Mil for Dry and $7,080 Mil for Wet
  - Level 3 = $7,310 Mil for Dry and $9,040 Mil for Wet
- Total PV Cost Range per Plant
  - Level 2 = $3.5 Mil to $2,240 Mil per plant
  - Level 3 = $22 Mil to $2,470 Mil per plant
- Total PV Unit Costs
  - Level 2: 0.4 to 43 $/gpd
    (Flow-Weighted = $7.5/gpd for dry and $8.4/gpd for wet)
  - Level 3: 2.9 to 46 $/gpd
    (Flow-Weighted = $9.8/gpd for dry and $10.8/gpd for wet)

Load Reduction with Respect to Current Discharge:

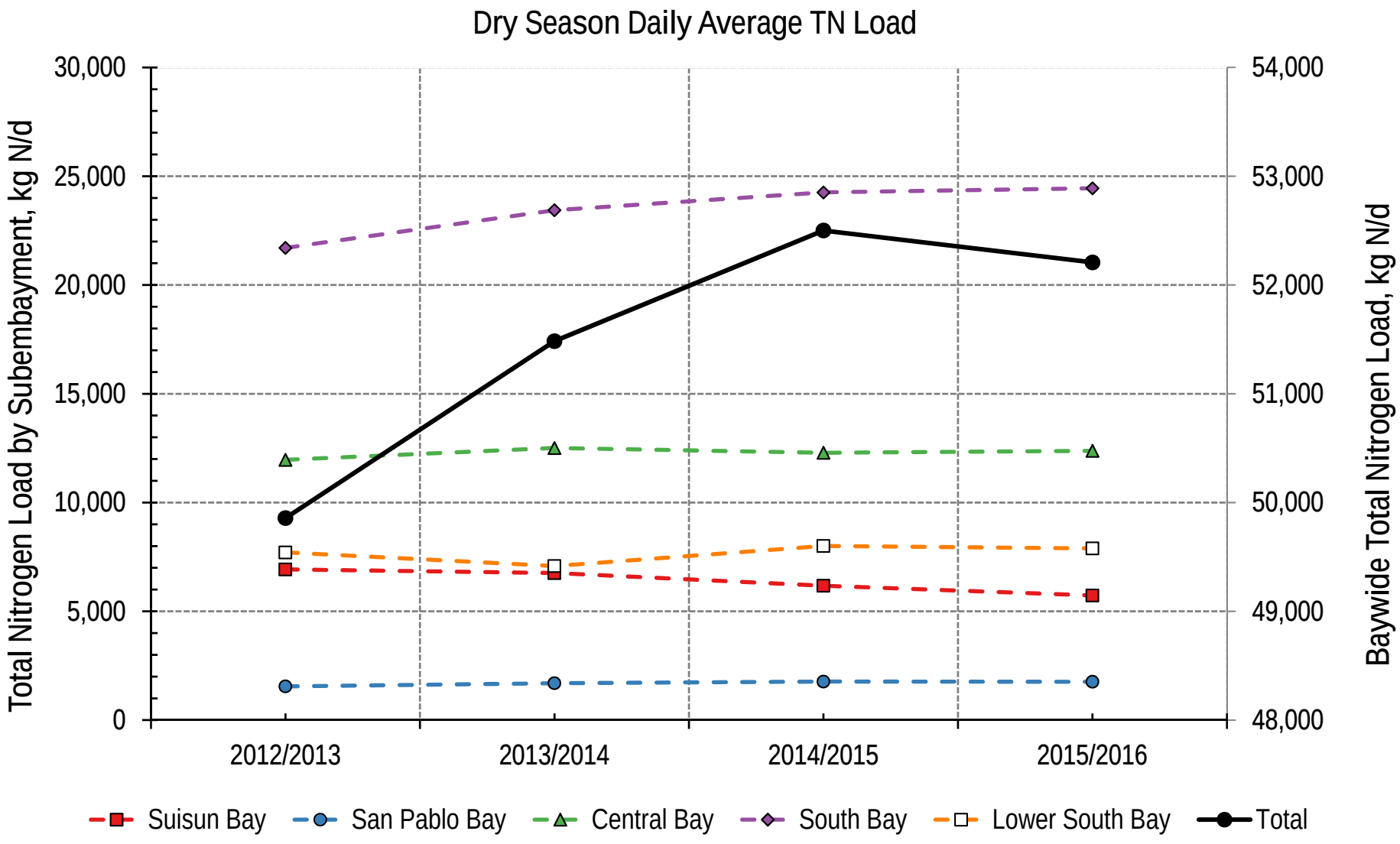
- Level 2 and 3: >90% for Ammonia
- Level 2: about 55-60% for TN and TP
- Level 3: about 80-85% for TN and TP

DRAFT: Projecting Baywide Preliminary Total N Results (Dry plus Wet Season)



- Optimization = 10-yr planning horizon
- Sidestream and Upgrades (Level 2 and 3) = 30-yr planning horizon

2016 Trend for Nutrient Loadings to Bay



2nd Watershed Permit

- Water Board's Intent
  - Continued individual and group reporting
  - Continued funding for the science ($)
  - Report on nutrient reductions via "non-conventional" alternatives
  - Discharge load caps

  OR

  - Continued individual and group reporting
  - Continued funding for the science ($$$), in lieu of load caps
  - Report on nutrient reductions via "non-conventional" alternatives

Next Steps

- Assess BACWA member support for increasing science funding to 2.5 x the current amount for 2nd Watershed Permit
- For those members of BACWA who agree to enter into the 2nd Watershed Permit, negotiate the details of other provisions and reach agreement with the Water Board
- Members not wishing to come under the 2nd Watershed Permit would negotiate their own permits directly with the Water Board

Questions? Please Contact

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