Bay Area Clean Water Agencies
A Joint Powers Public Agency
Leading the Way to Protect our Bay

Nutrient Related Issues

Potential Nutrient Related Issues

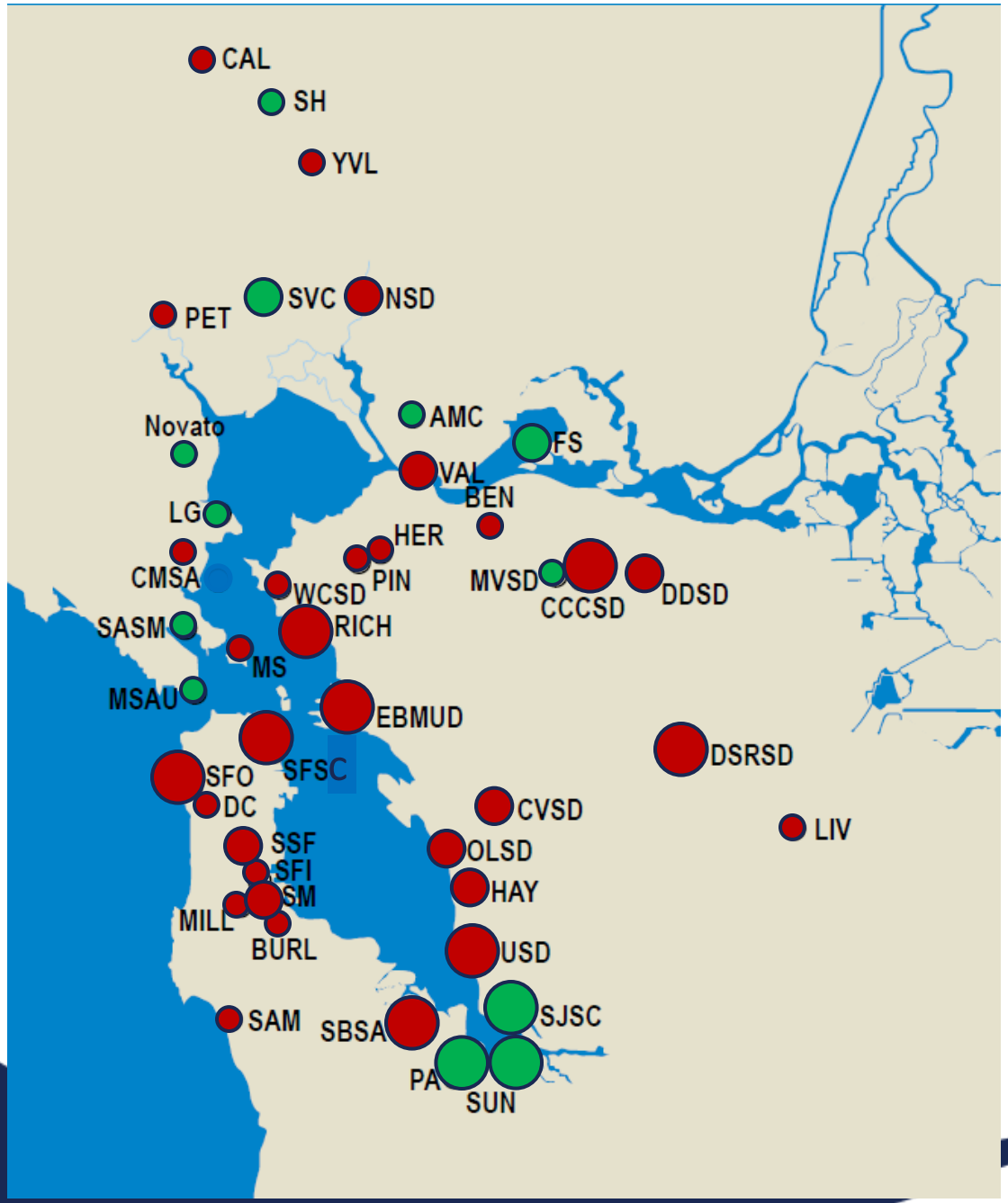
- For San Francisco Bay
  - Unionized Ammonia
  - Dugdale's Nitrate Inhibition Hypothesis

- For Suisun Bay
  - Unionized Ammonia – delta smelt
  - Dissolved Oxygen – ammonia + BOD
  - Microcystis – ammonia
  - Dugdale's Nitrate Inhibition Hypothesis

Unionized Ammonia

- Total Ammonia Nitrogen (TAN) in the water column
  - TAN = $NH_4^+ + NH_3$
  - NH_3 is the toxic form of ammonia
  - NH_3 = f(TAN, pH, Temp, Sal)

- San Francisco Bay Basin Plan – NH_3 Limits
  - Annual Median = 0.025 mg N/L (chronic)
  - North (San Pablo) Bay = 0.16 mg N/L (acute)
  - Central Bay Maximum = 0.16 mg N/L (acute)
  - Lower Bay Maximum = 0.4 mg N/L (acute)



Ammonia Removal

Carbon Removal

>20 mgd

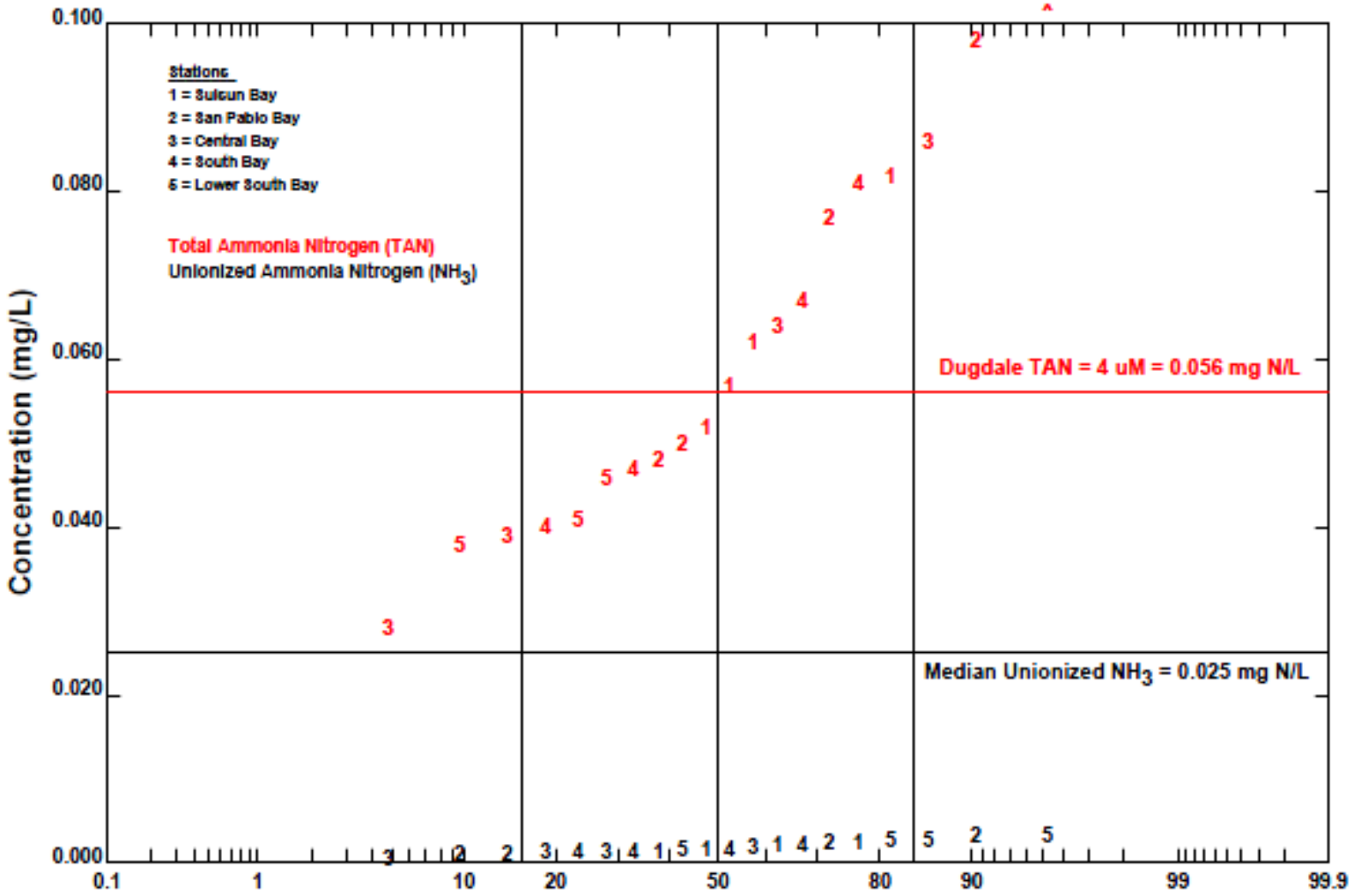
10-20 mgd

<10 mgd

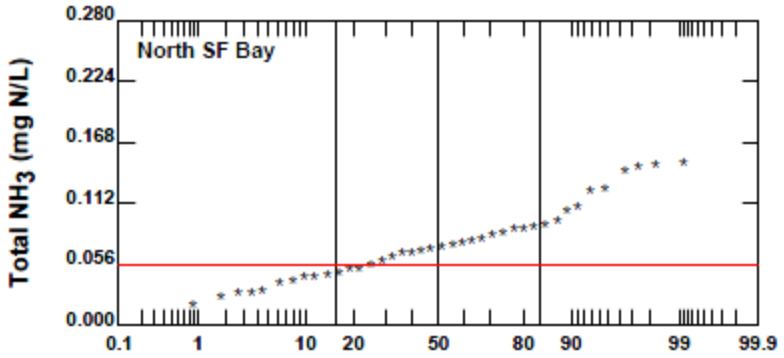
Potential NNE

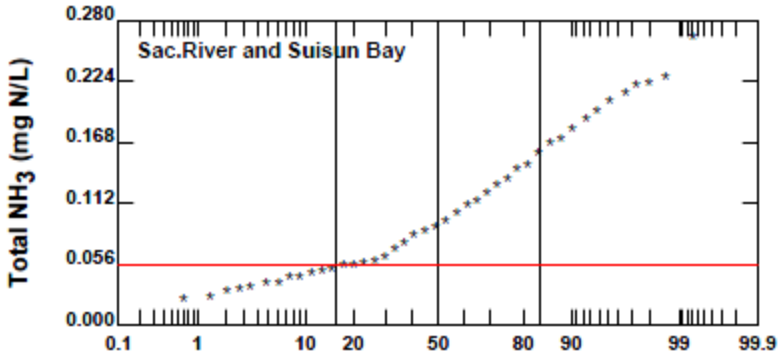
- Dugdale: Nitrate Inhibition → **Reduced Algal Growth**
  - Hypothesis that ammonia is inhibiting uptake of nitrate and reducing phytoplankton growth
  - First part of hypothesis is correct, phytoplankton prefer to utilize ammonia for growth; by inference you could say that there is nitrate inhibition
  - Second part of hypothesis is questionable

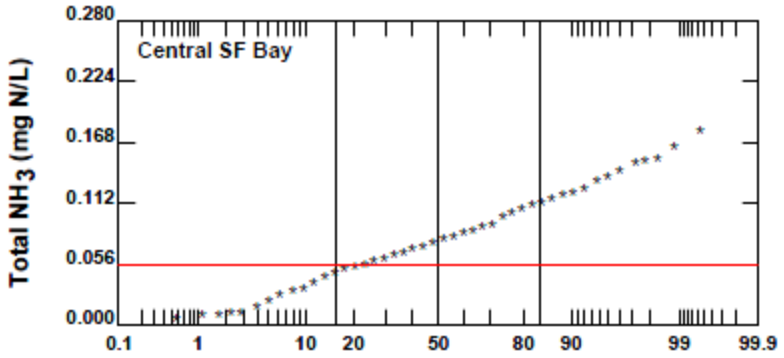
Where are we now?- RMP data

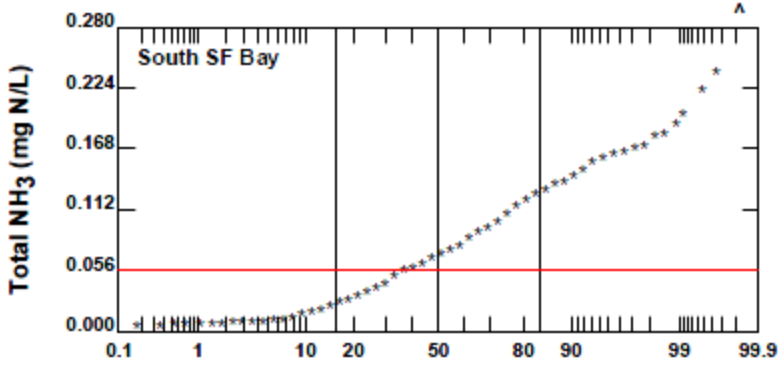


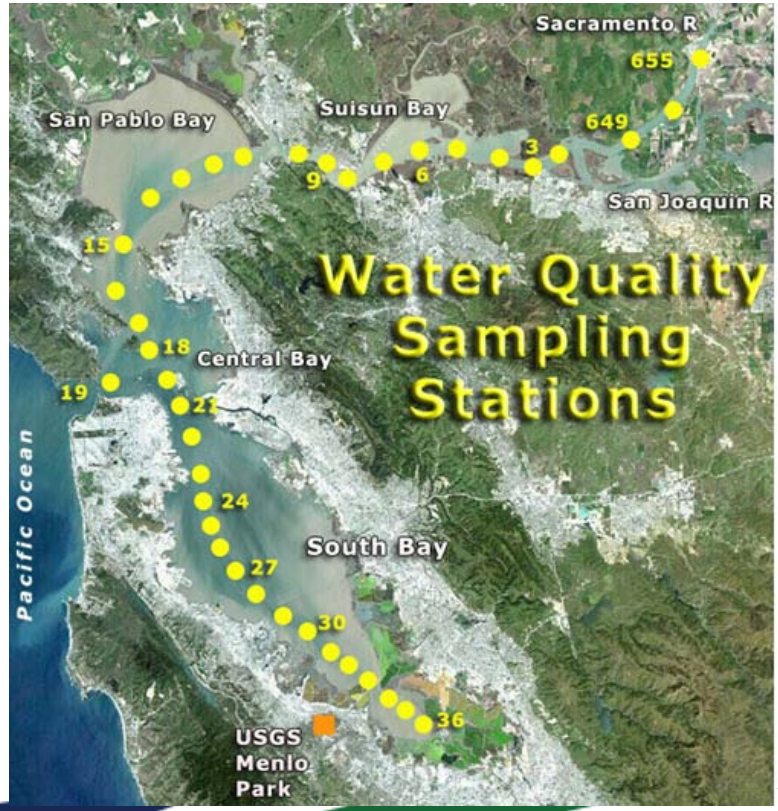
Where are we now?- USGS data



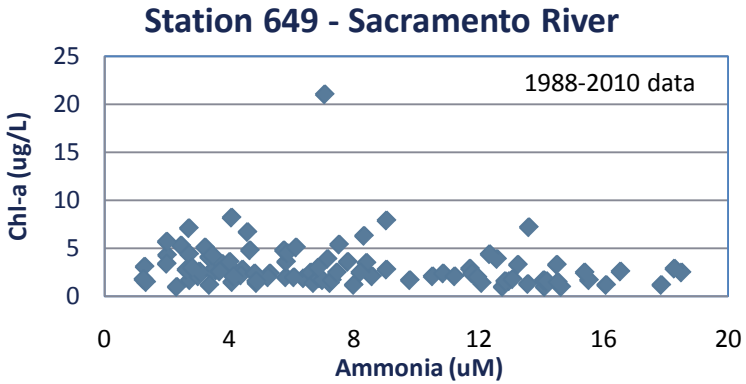


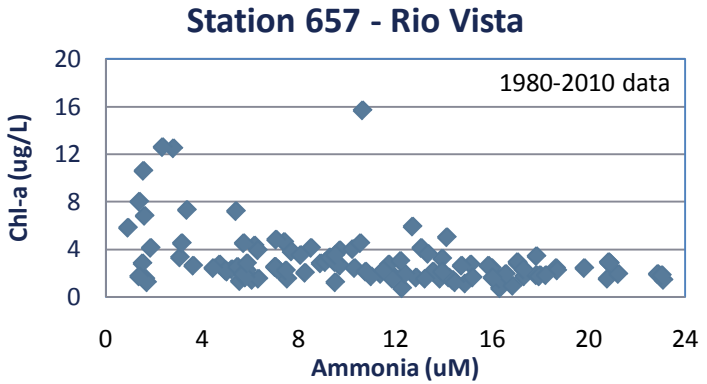


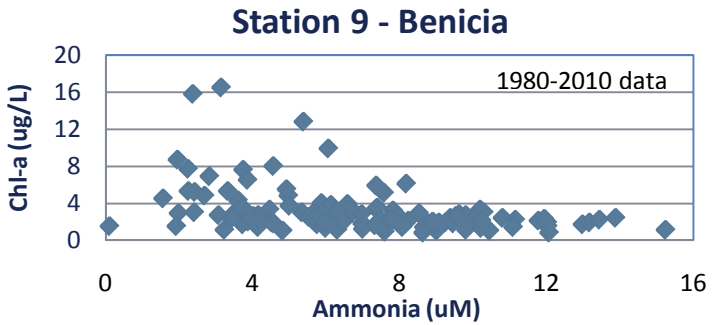


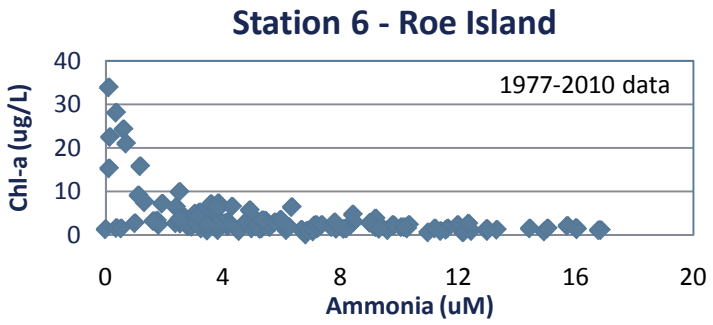


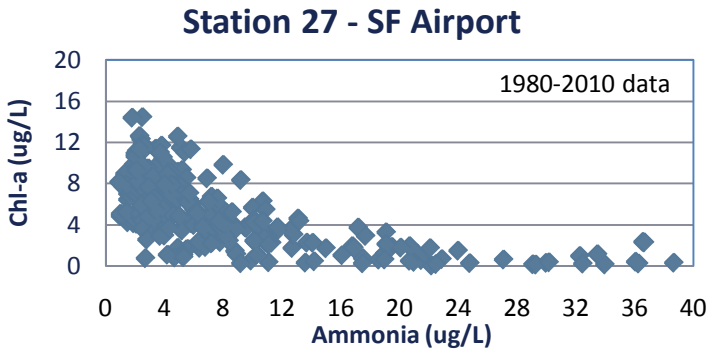
Chl-a vs. NH_3 – USGS data

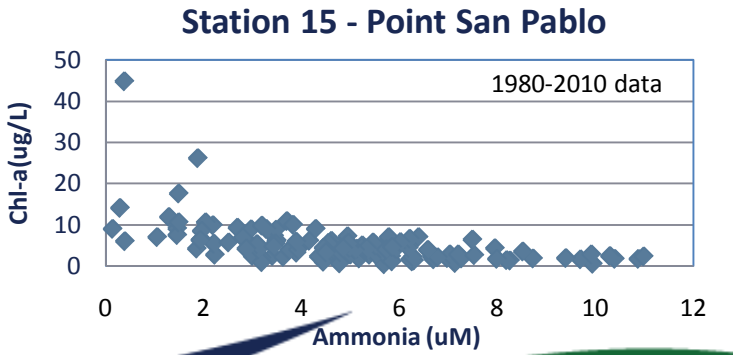




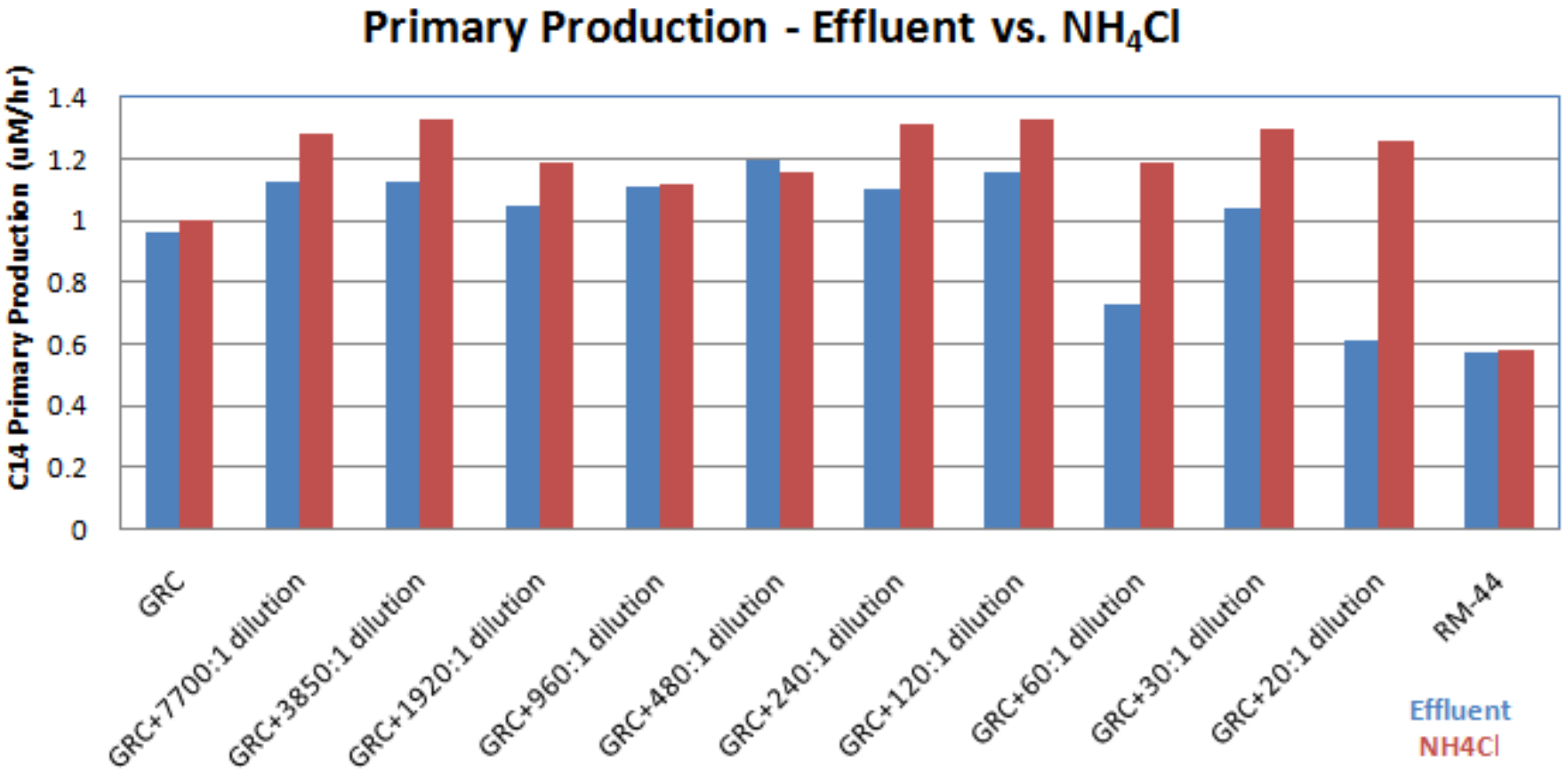








NH_3 Additions - Parker et al.



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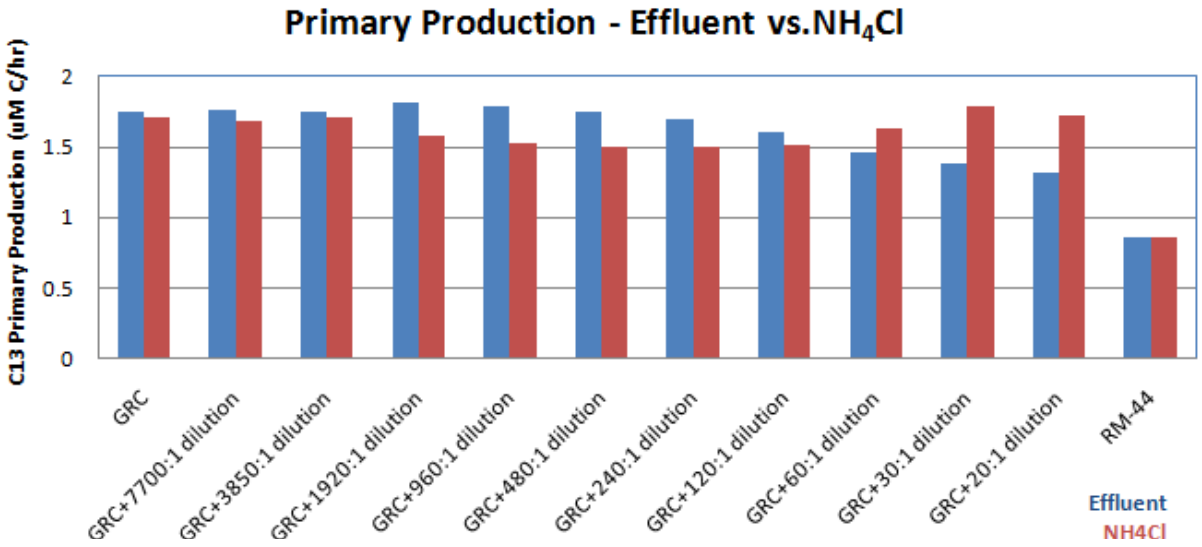

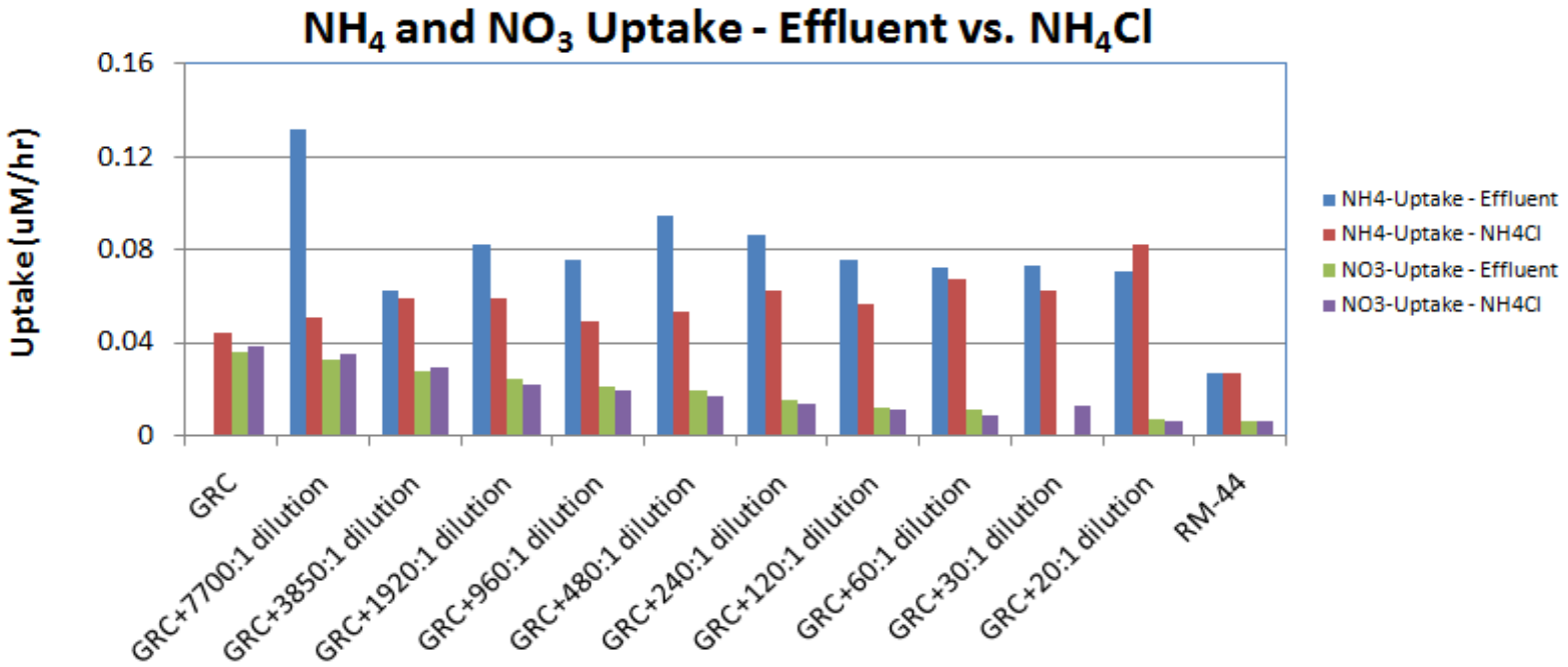

On-Going Work

- Under funding from SF Bay SWAMP and SFCWA, SFSU will continue and expand monitoring of the spring phytoplankton bloom in Suisun Bay
- Expansion to include Toxicity Identification Evaluations (TIEs) – NH_3, pesticides/herbicides, copper impacts on diatoms