

Nutrient loads and transformations in Suisun Bay and the Delta

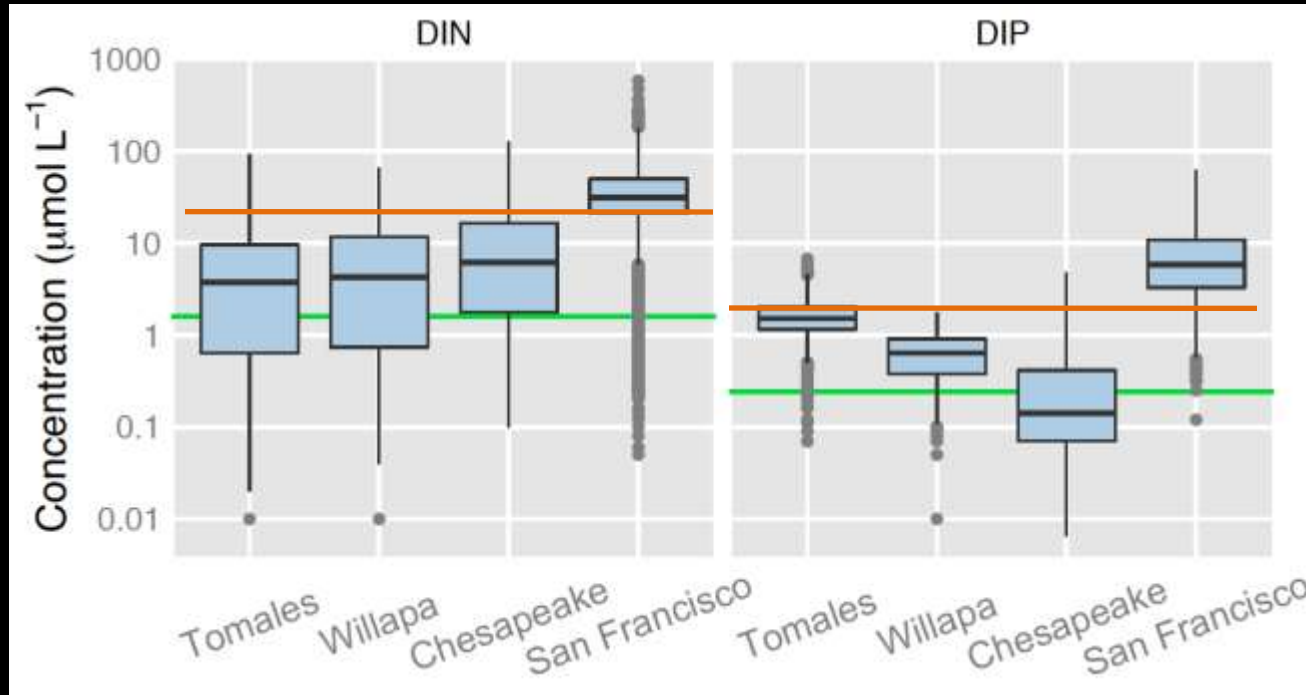


Emily Novick and David Senn (SFEI)

Marianne Guerin (RMA)

Carol Kendall and Megan Young (USGS)

Nutrients in SF Bay



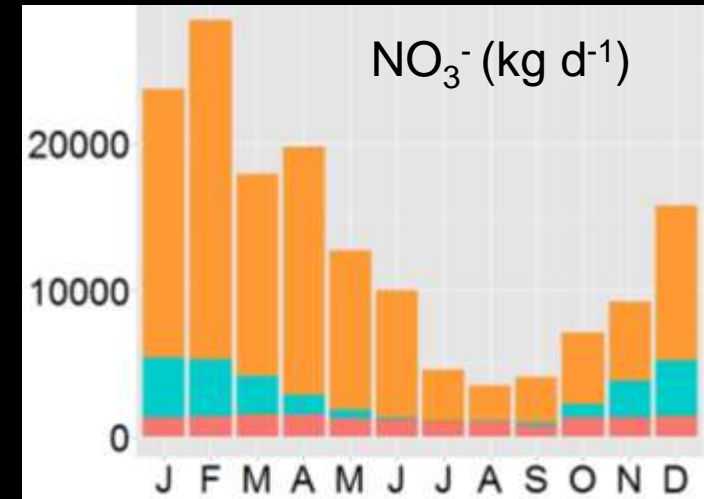
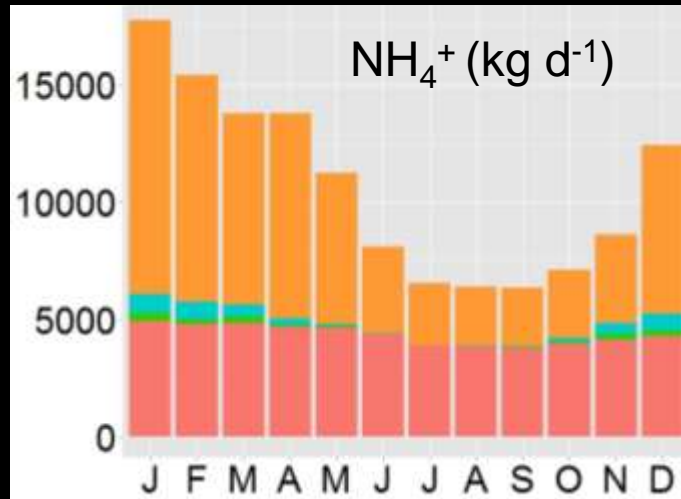
Jassby and Cloern 2012

Sources:

- Wastewater discharge
- Stormwater runoff
- Riverine inputs through the Delta
- Oceanic input
- Others

Motivation

Loads from the Delta are the dominant source of nutrients into Suisun Bay during most times of the year



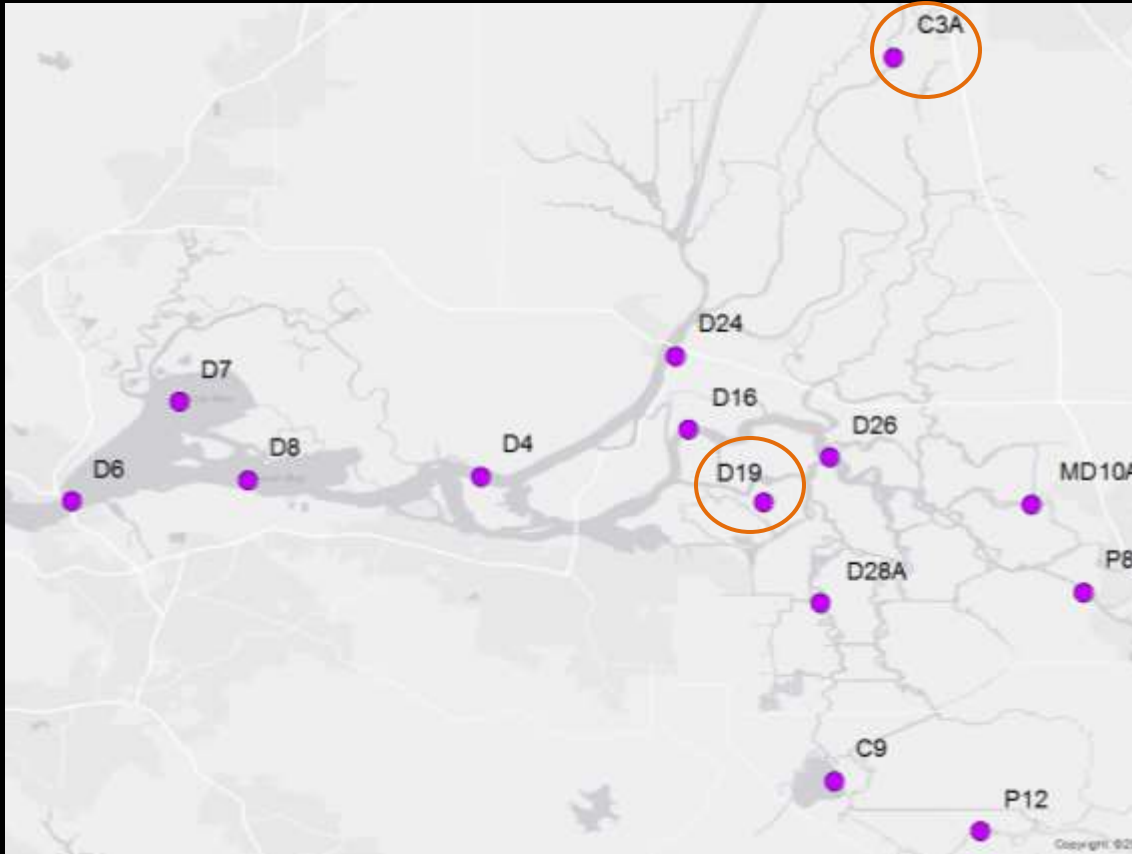
SFEI, 2014a

How are loads into San Francisco Bay regulated by upstream transformations and losses within the Delta?

Are transformations/losses also evident within Suisun Bay?

Motivation

DWR-EMP



D19 is ~90%
Sacramento River
water (on average)

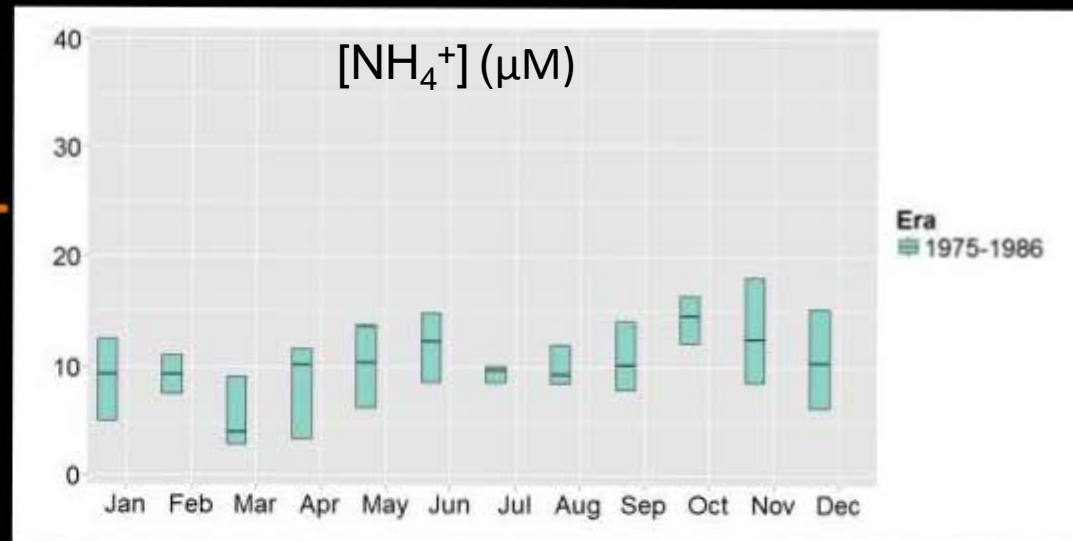
~70% during summer
months

(M. Guerin, RMA)

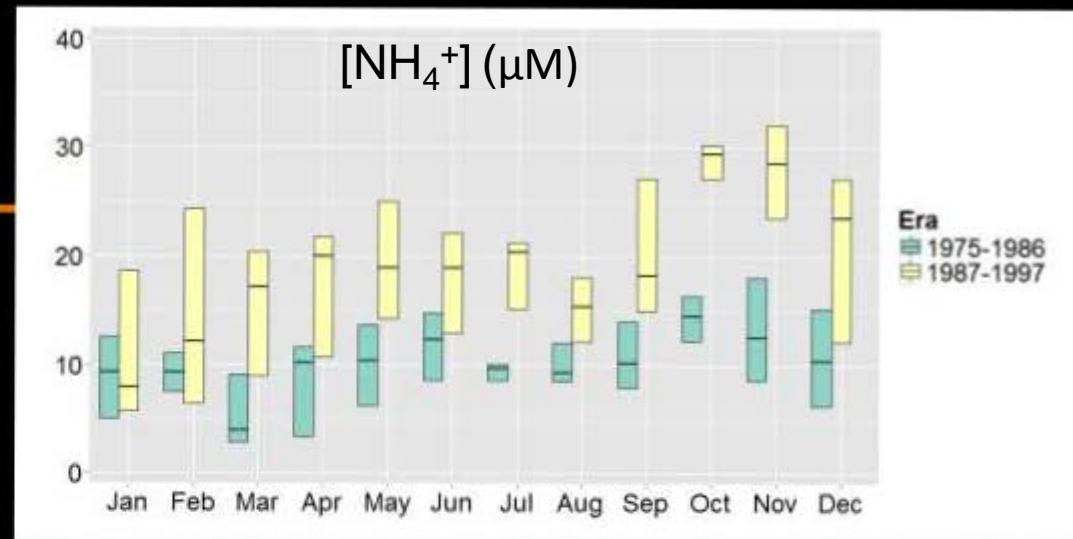
Motivation



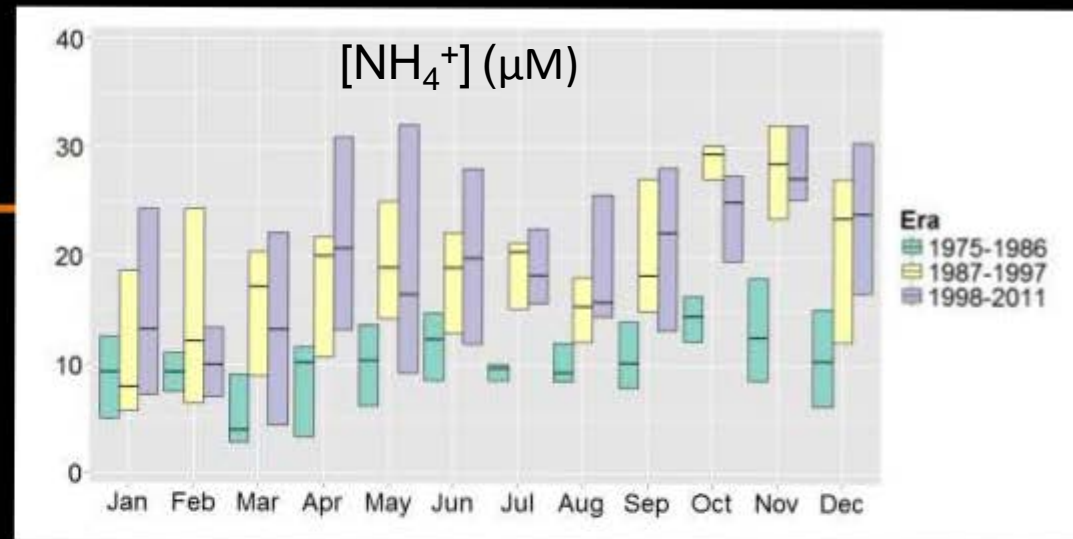
Motivation



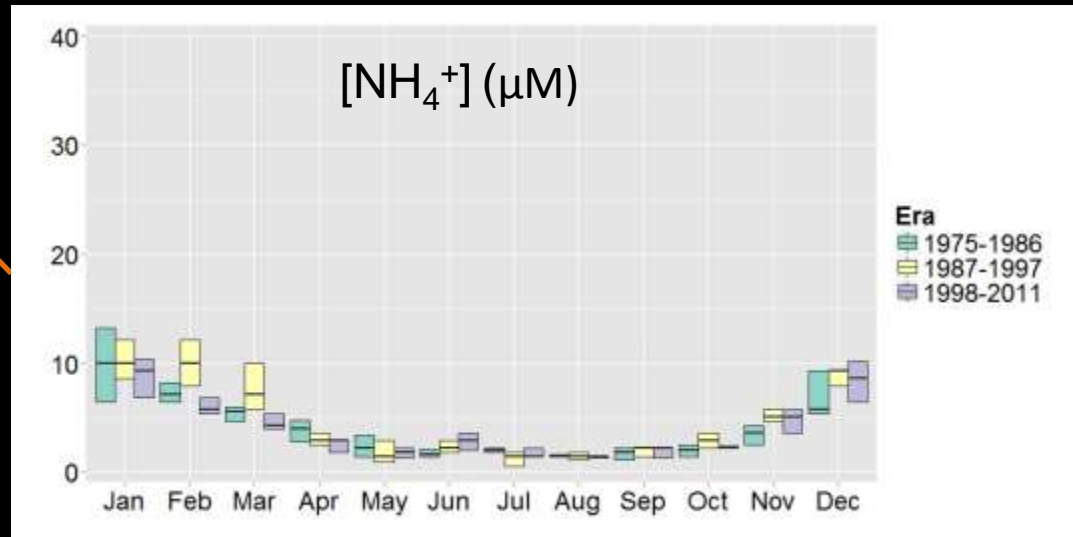
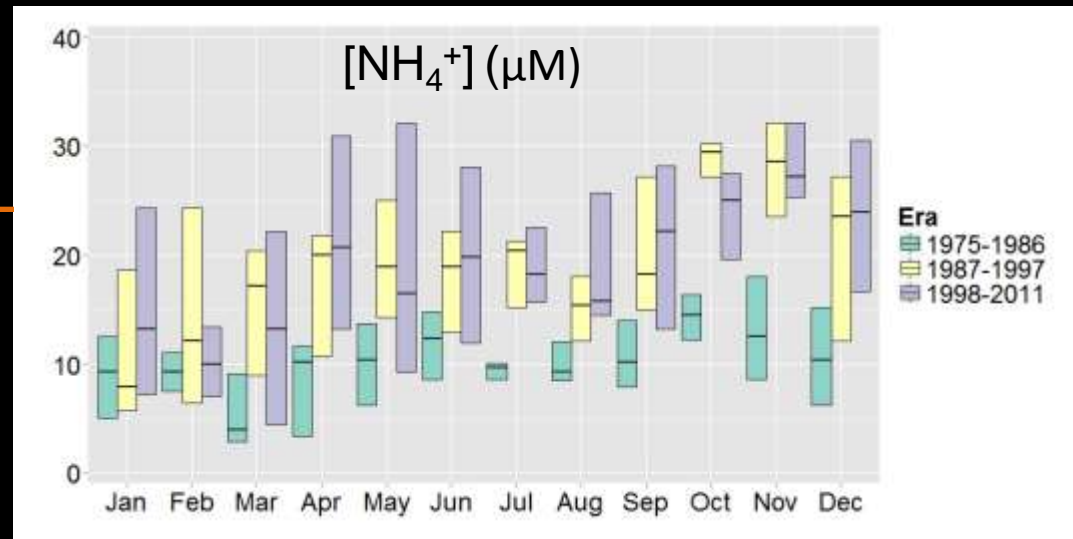
Motivation



Motivation



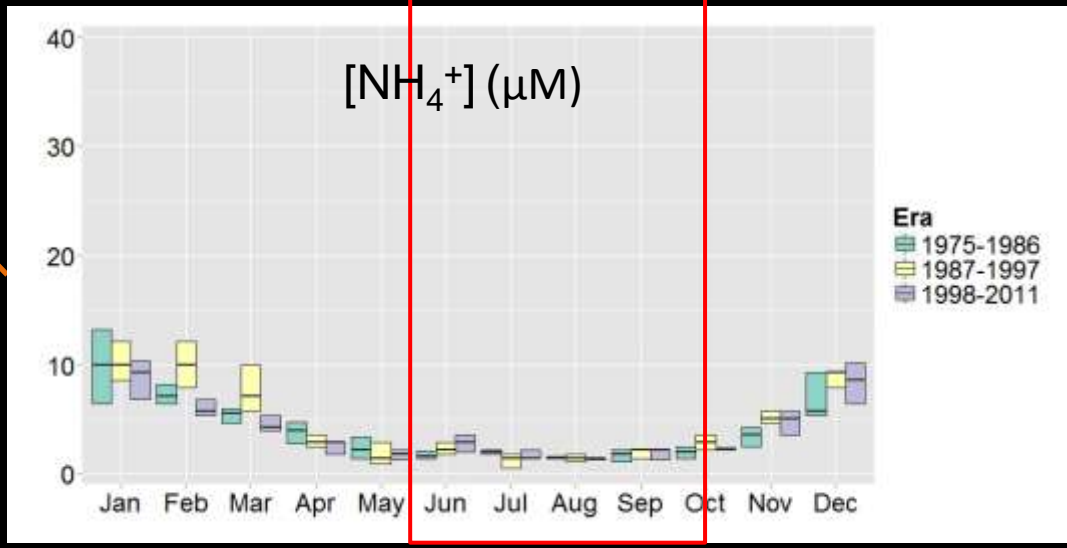
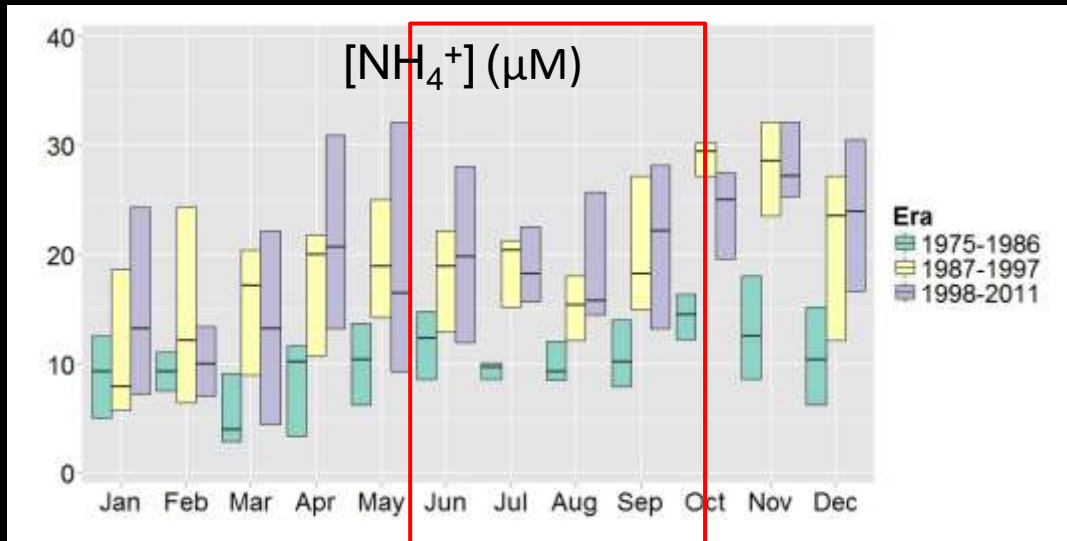
Motivation



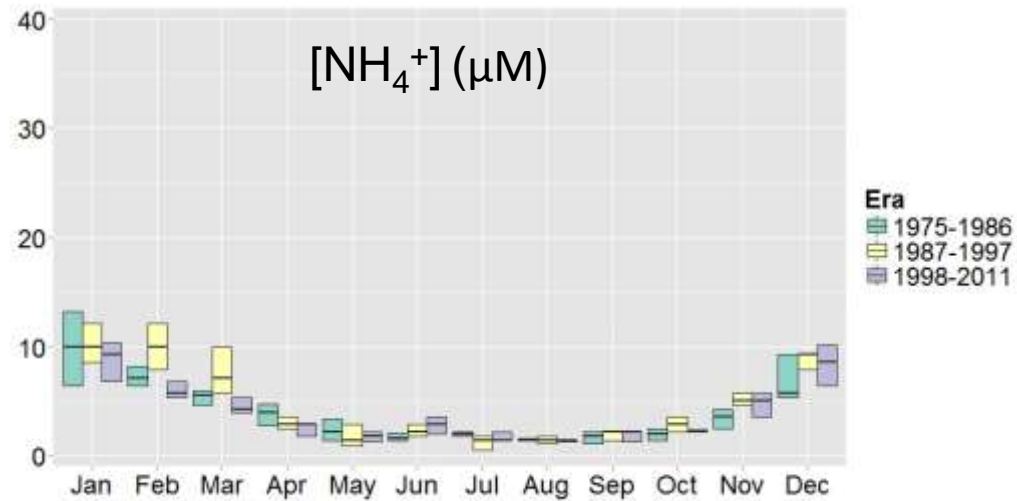
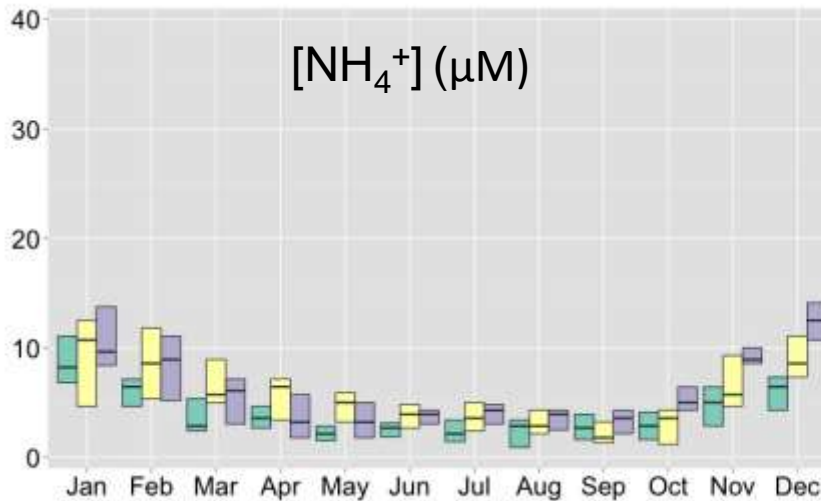
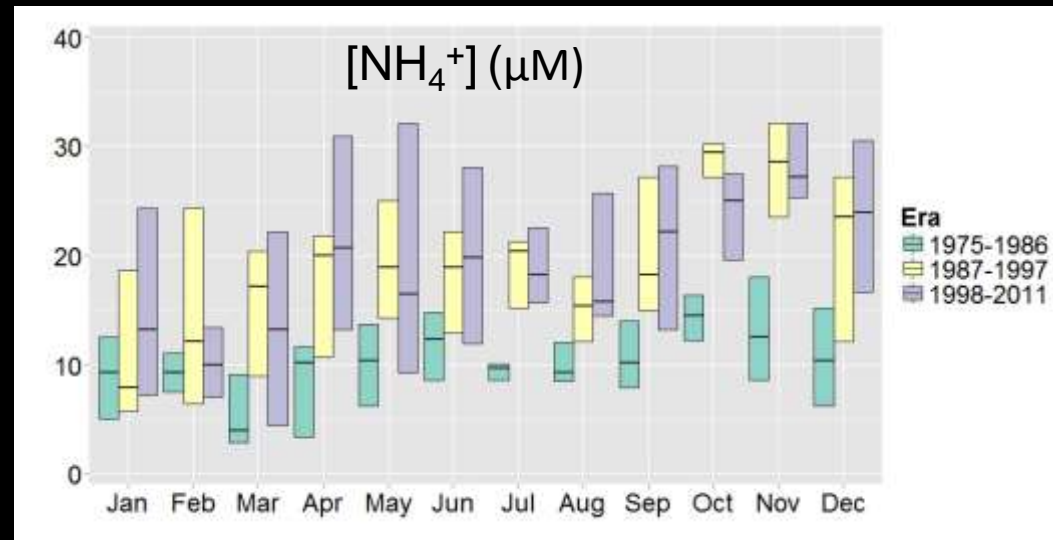
Motivation



Suggests significant transformation in the Delta, particularly during summer months



Motivation



Is the seasonality observed in Suisun Bay due solely to seasonality in loads, or is there also transformation?

Box model approach



Similar approach to Jassby and Cloern (2000)
DWR DAYFLOW and water quality data

Box model approach



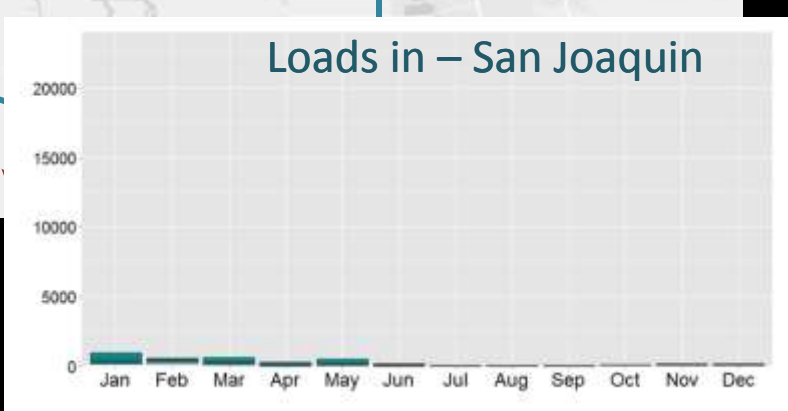
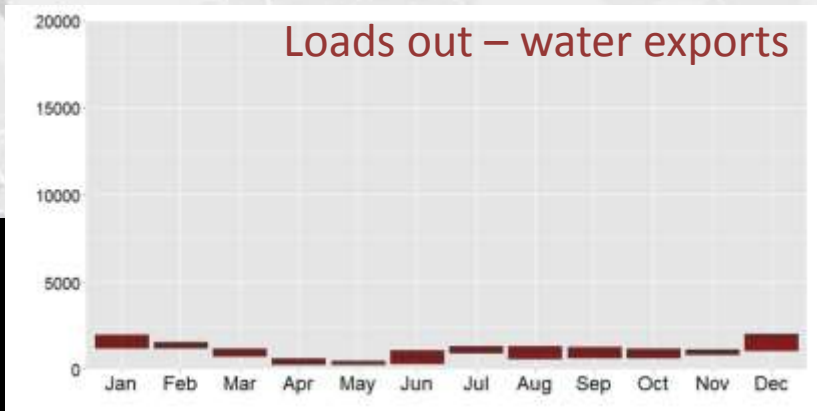
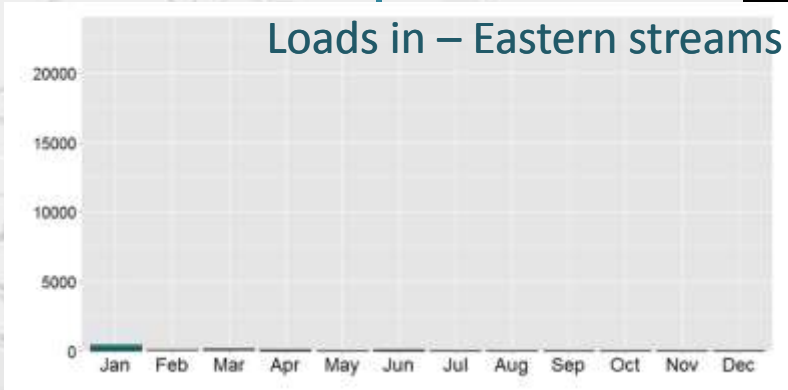
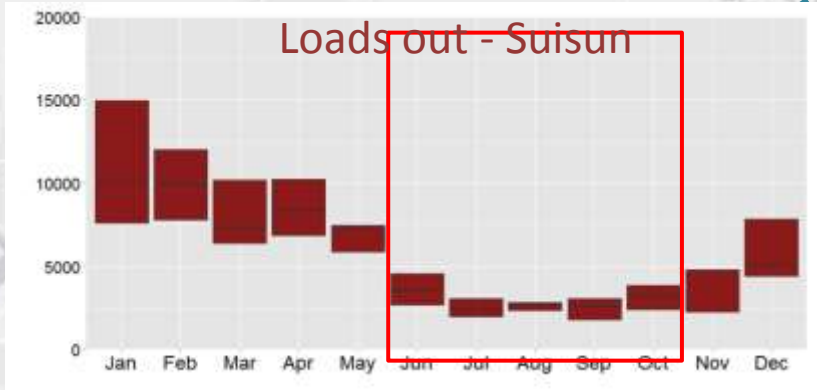
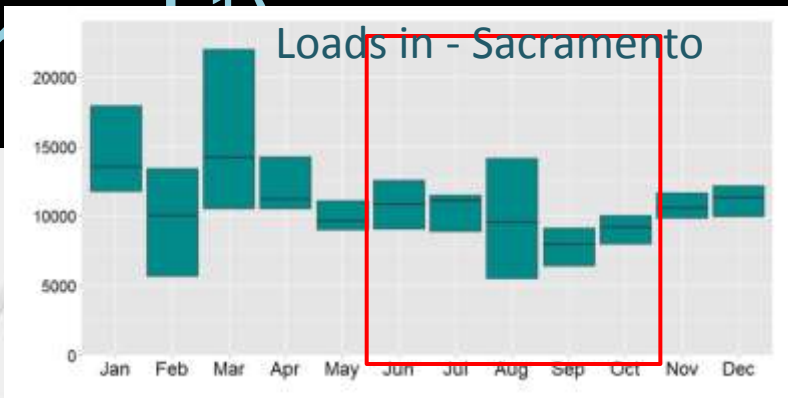
Box model approach



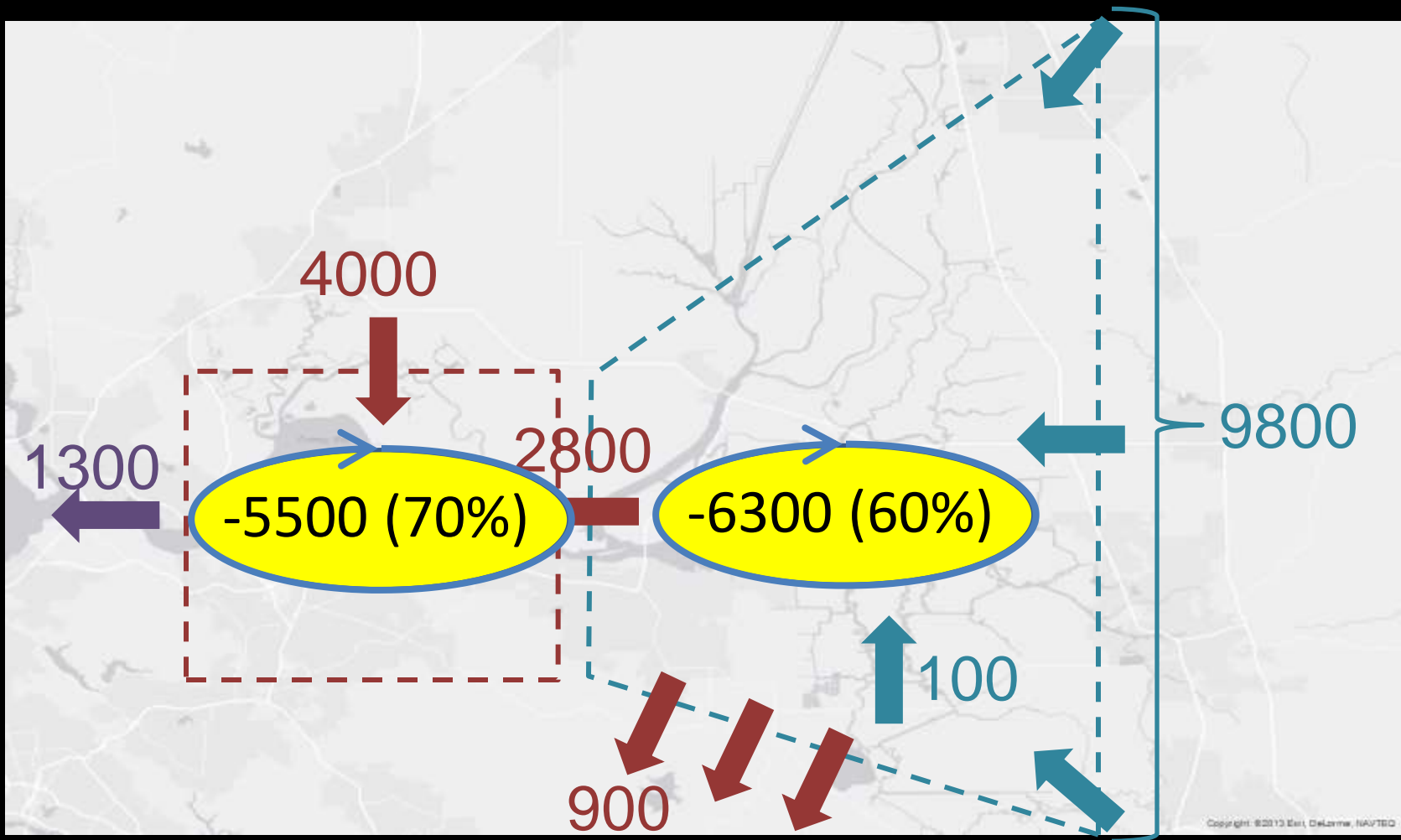
2005-2011
 NH_4^+ , NO_3^- and DIN

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Results - NH₄⁺ loads (kg d⁻¹)

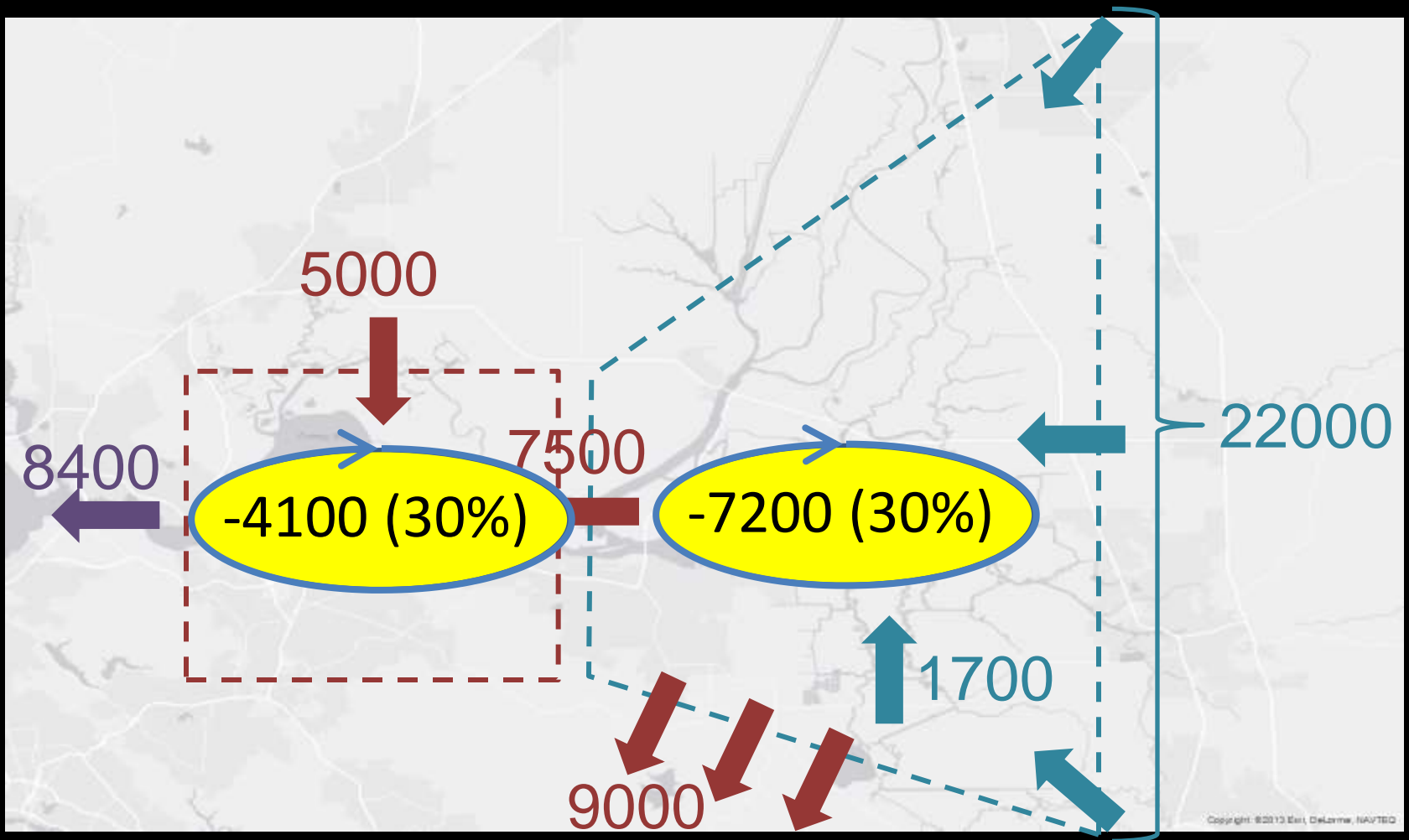


Results - NH₄⁺ loads (kg d⁻¹)



2005-2011, June – Oct
NH₄⁺ (kg d⁻¹)

Results – DIN loads (kg d⁻¹)



2005-2011, June – Oct
DIN (kg d⁻¹)

Recommendations

1. Refine loads estimates
2. Explore transformations and losses on finer spatial and temporal scale

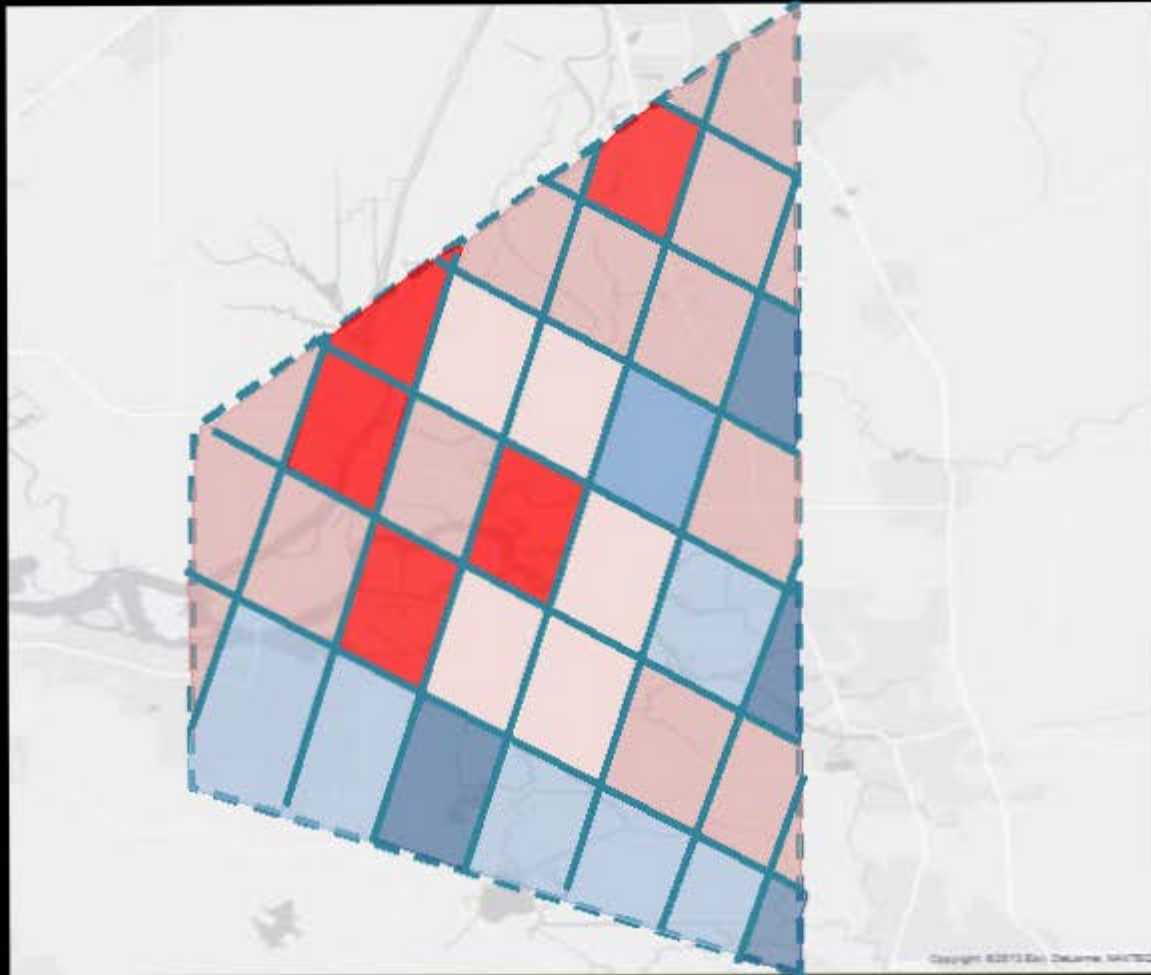
Recommendations



Recommendations



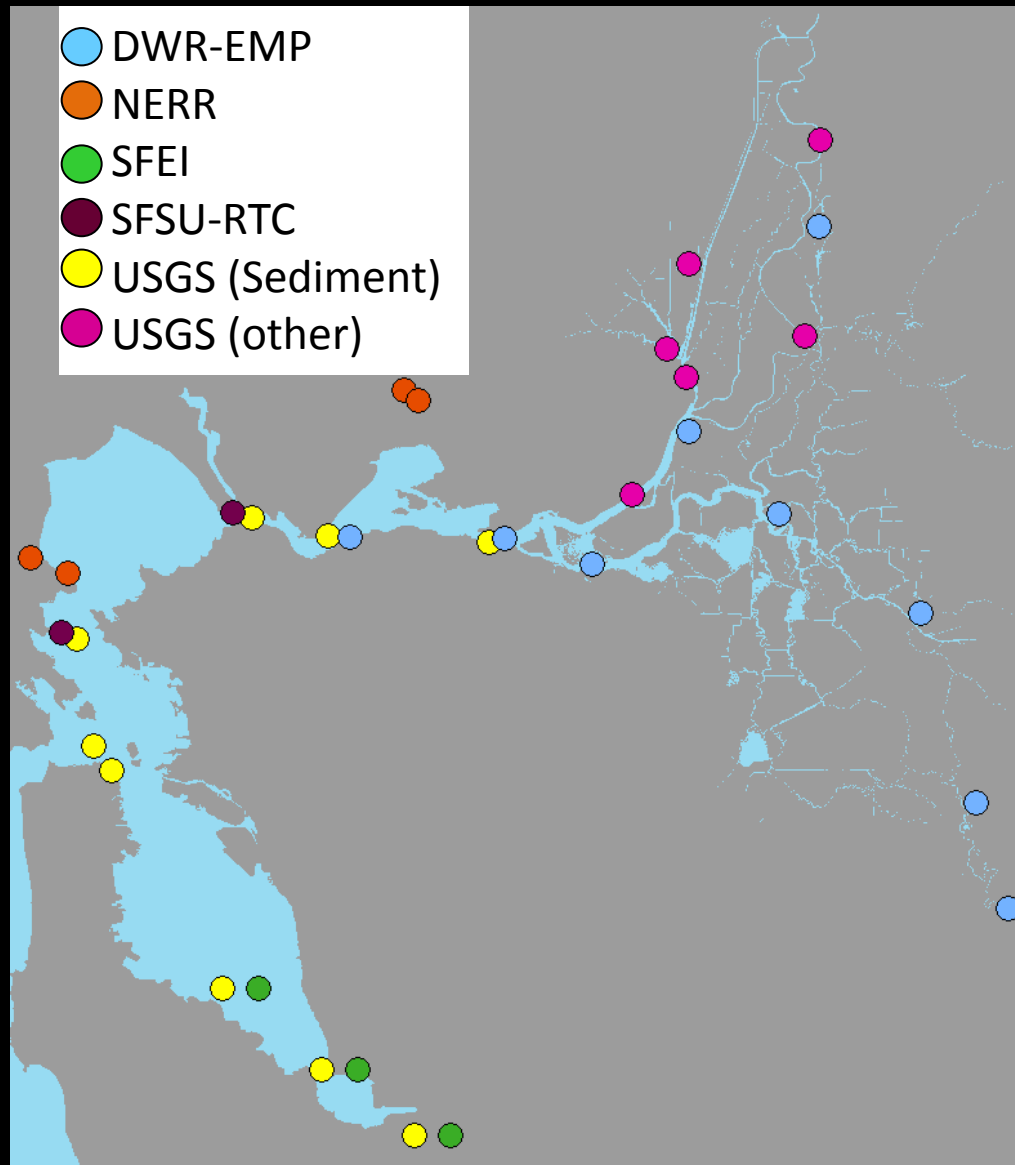
Recommendations



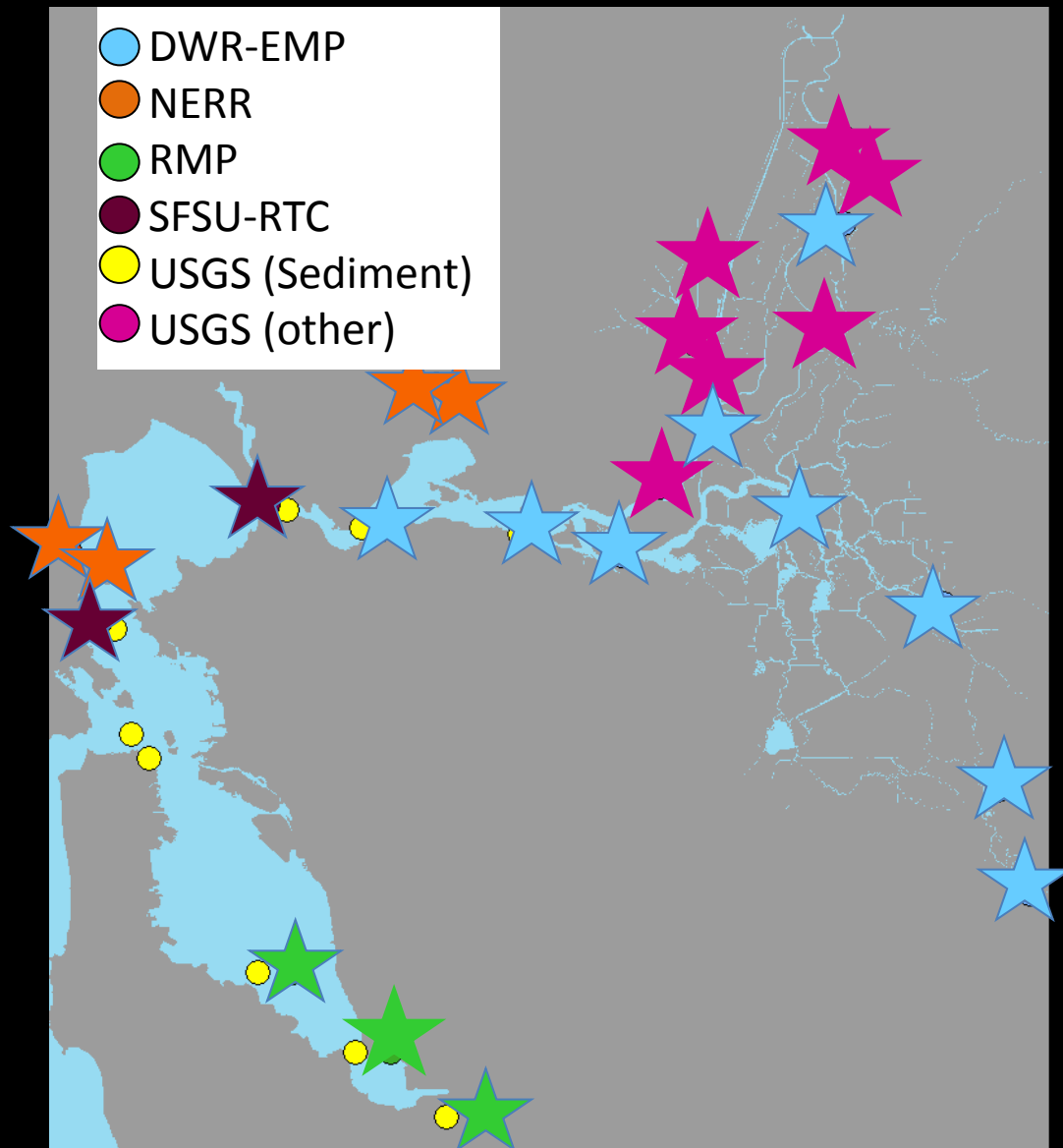
Recommendations

1. Refine loads estimates
2. Explore transformations and losses on finer spatial and temporal scale
3. Simulate how the magnitude and form of nutrient loads to Suisun Bay may change under future conditions

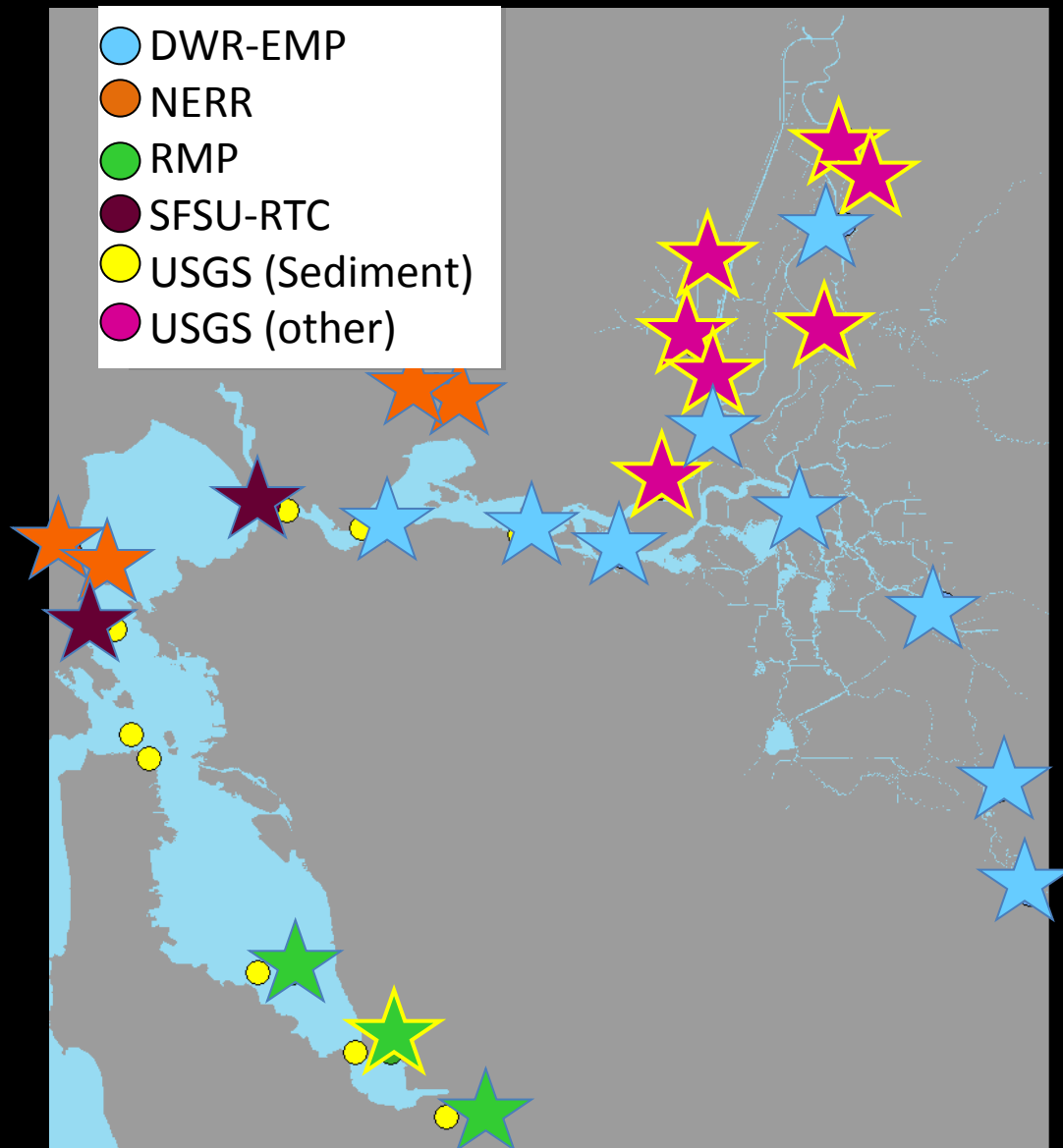
High-frequency monitoring



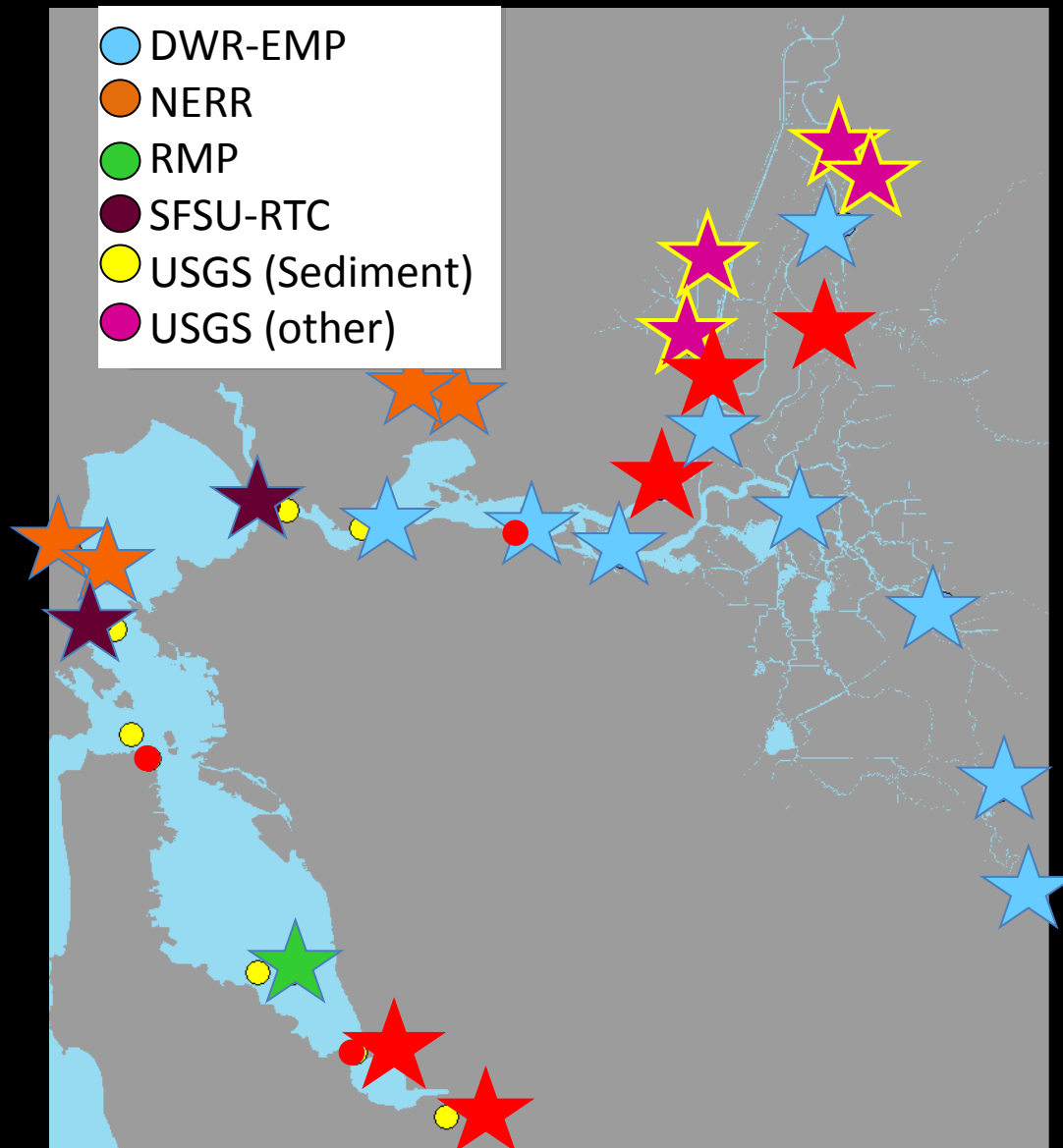
High-frequency monitoring



High-frequency monitoring



High-frequency monitoring



High-frequency monitoring

QuickTime Player File Edit View Window Help

www.enviz.org/nutviz/

www.enviz.org/nutviz/

NutViz

Lock Graphs

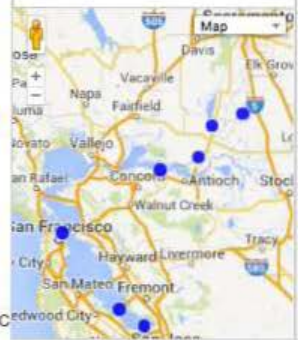
Add A New Graph Window →

Sampling Stations. Click arrow to expand. Drag analyte to graph panel to graph.

- Alviso Slough
- Cache Slough
- Delta Cross Channel
- Dumbarton Bridge
- Exploratorium at Pier 17
- Mallard Island
- Rio Vista at Decker Island

Day Dynamic

1 Graph Window



The image shows a screenshot of a web browser displaying the NutViz application. The browser's address bar shows the URL 'www.enviz.org/nutviz/'. The application interface includes a sidebar with a list of sampling stations, a main graph window, and a map of the San Francisco Bay Area. The map shows several blue dots representing sampling stations in the bay area. The sidebar also includes a 'Lock Graphs' button and an 'Add A New Graph Window' button. The main graph window is currently empty, and there are radio buttons for 'Day' and 'Dynamic' below the station list.

Funders

Interagency Ecological Program (DWR)

Collaborators

M. Guerin (RMA)

C. Kendall (USGS)

M. Young (USGS)

Data Sources

DWR

City of Tracy

City of Stockton

Central Contra Costa SD

Delta Diablo SD

Fairfield Suisun SD

Mt View SD

USGS

References

Cloern, J.E. and Jassby, A.D. (2012). Drivers of Change in Estuarine-Coastal Ecosystems: Discoveries from Four Decades of Study in San Francisco Bay.

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Cornwell, J. C. et al (2014). Nutrient Fluxes from Sediment in the San Francisco Bay Delta. *Estuaries and Coasts*. Vol 37, 1120-1133

Jassby, A. D. and Cloern, J.E. (2000). Organic Matter Sources and Rehabilitation of the Sacramento-San Joaquin Delta. *Aquatic Conserv. Mar. Fresh. Ecosyst*. Vol 10: 323-352

SFEI (2014a.) External Nutrient Loads to San Francisco Bay. SFEI, Richmond, CA. Contribution No. 704

Contact:

emilyn@sfei.org

davids@sfei.org