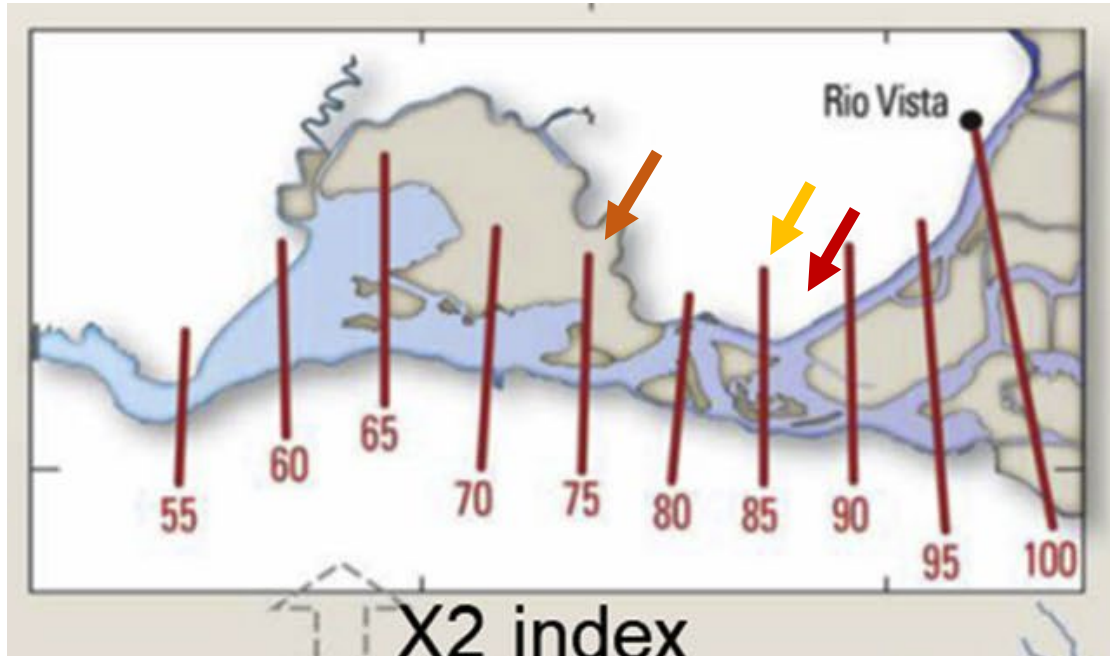


# Climate Whiplash in the San Francisco Estuary: Residence time and water temperature are key correlates to *Microcystis* bloom amplitude



85 km: Peak *Microcystis* blooms  
 75 km: 2017 bloom-season avg,  
 87 km: 2014 bloom-season avg

\*X2: Distance from Golden Gate where bottom salinity is 2 ppt



19°C (66.2°F): bloom initiation

20°C (68°F): *Microcystis* has competitive advantage

19°C +: linear increase in abundance

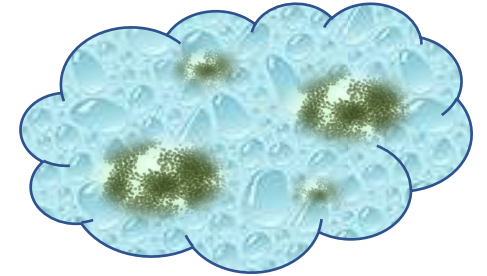
25°C (77°F): often exceeded in 2014

2014



Blooms present, High *Microcystis*

- ☀ Many extreme warm days
- 🌀 High Outflow
- 🕒 Low Residence Time



2017



Blooms present, Low *Microcystis*

- ☁ Fewer extreme warm days
- 💧 Low Outflow
- 🕒 High Residence Time

