

Microcystis in the Delta

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Background

Green cornflake



Microcystis

- Colonial cyanobacterium (blue–green algae)
- Diameter 6 to 50,000 μm
- Contains microcystins that promote liver cancer in humans and wildlife

Delta

- Blooms began 1999 in Delta
- Vertically migrates daily to surface between 10 am to 4 pm
- Peak biomass in August and September



distribution

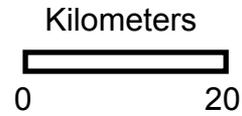


California

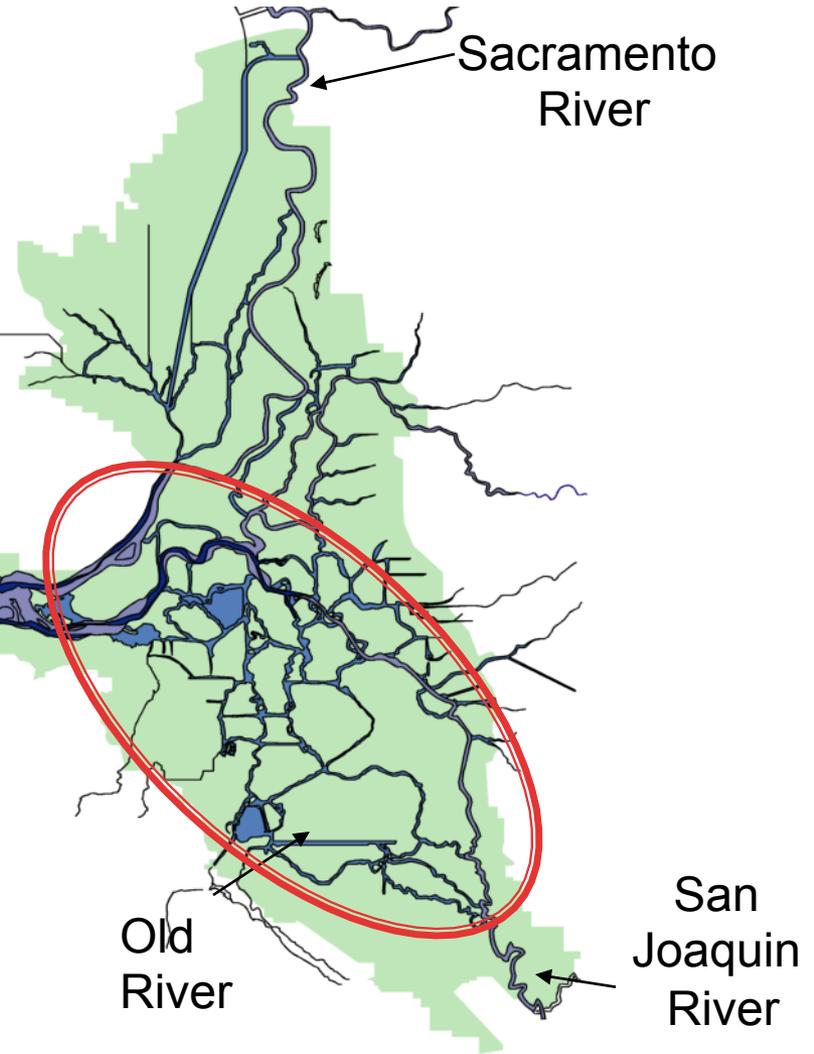
San Pablo Bay

Suisun Bay

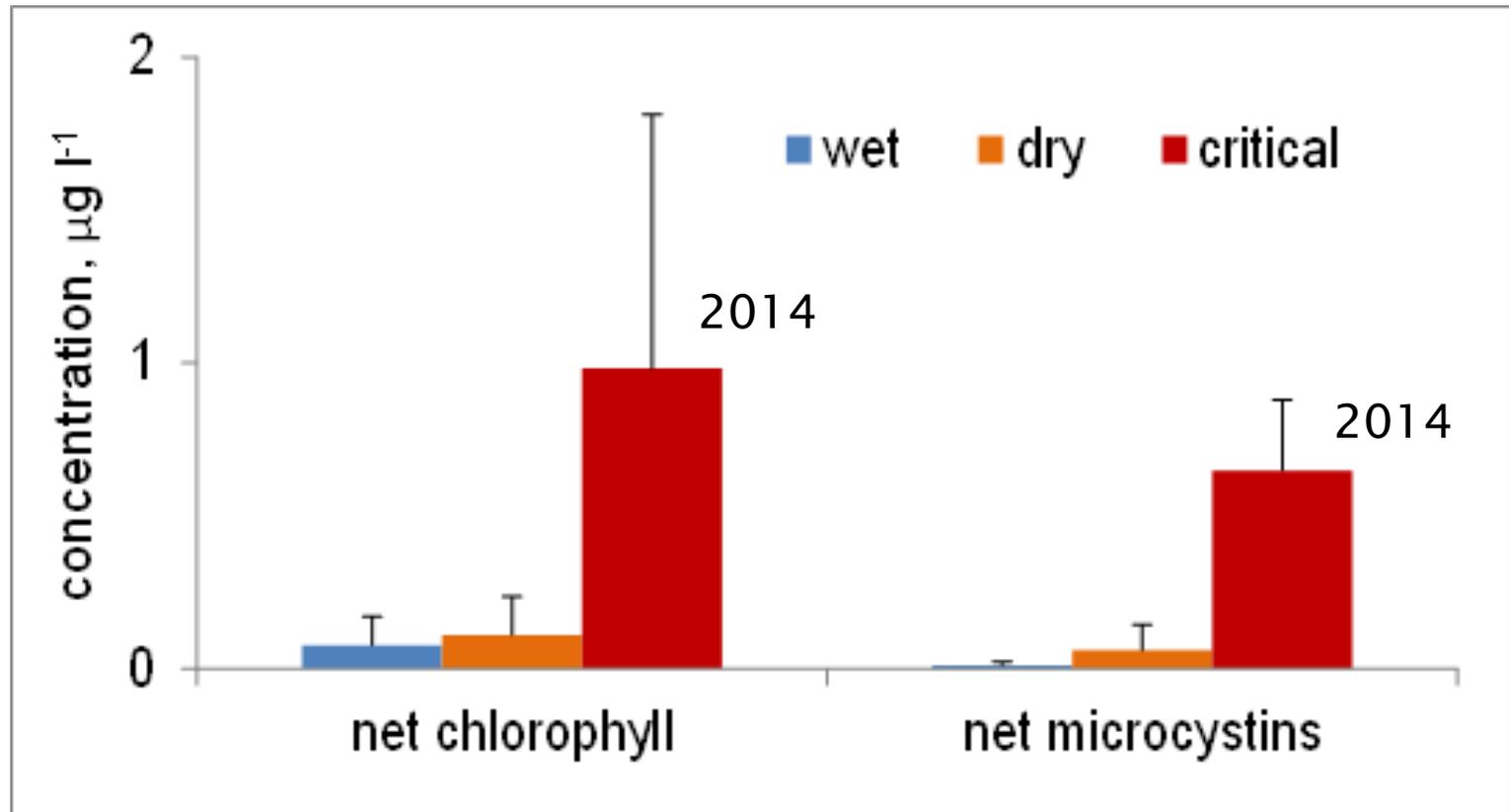
San Francisco Bay



122° W



drought



Wet: 2004–2005
Dry: 2007–2008

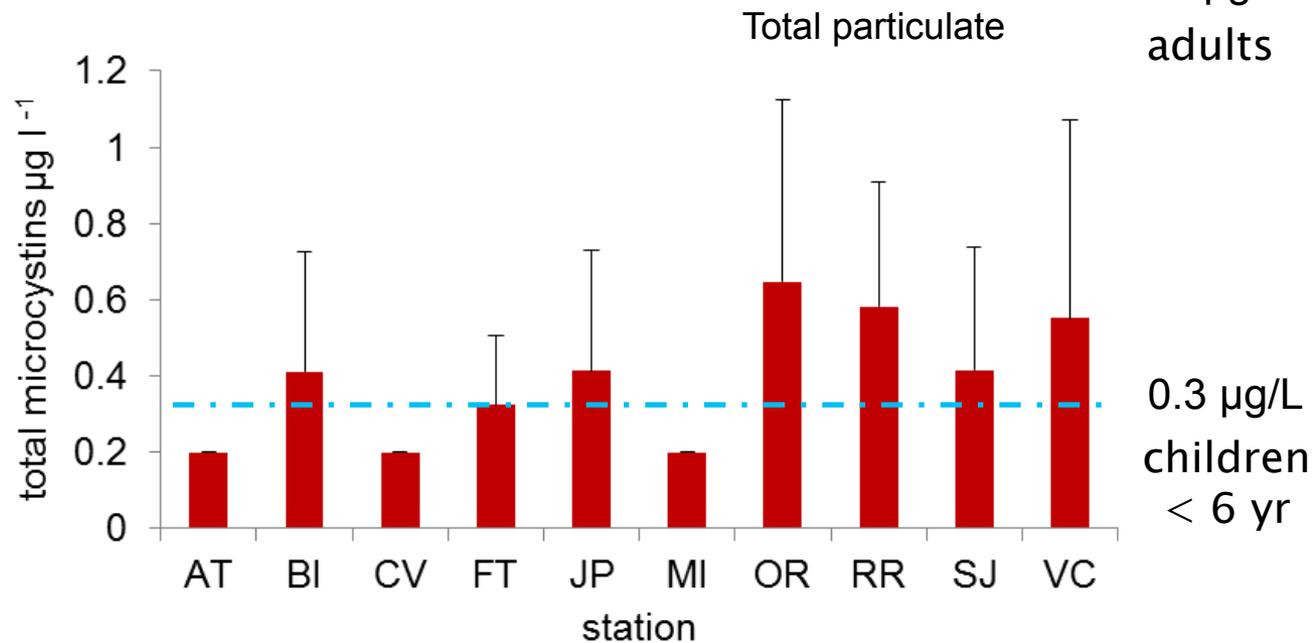
toxin concentration

2014

U.S. EPA
(Drinking)
1.6 $\mu\text{g/L}$
adults

California
(recreation)

0.8 $\mu\text{g/L}$



Integrated
surface sample

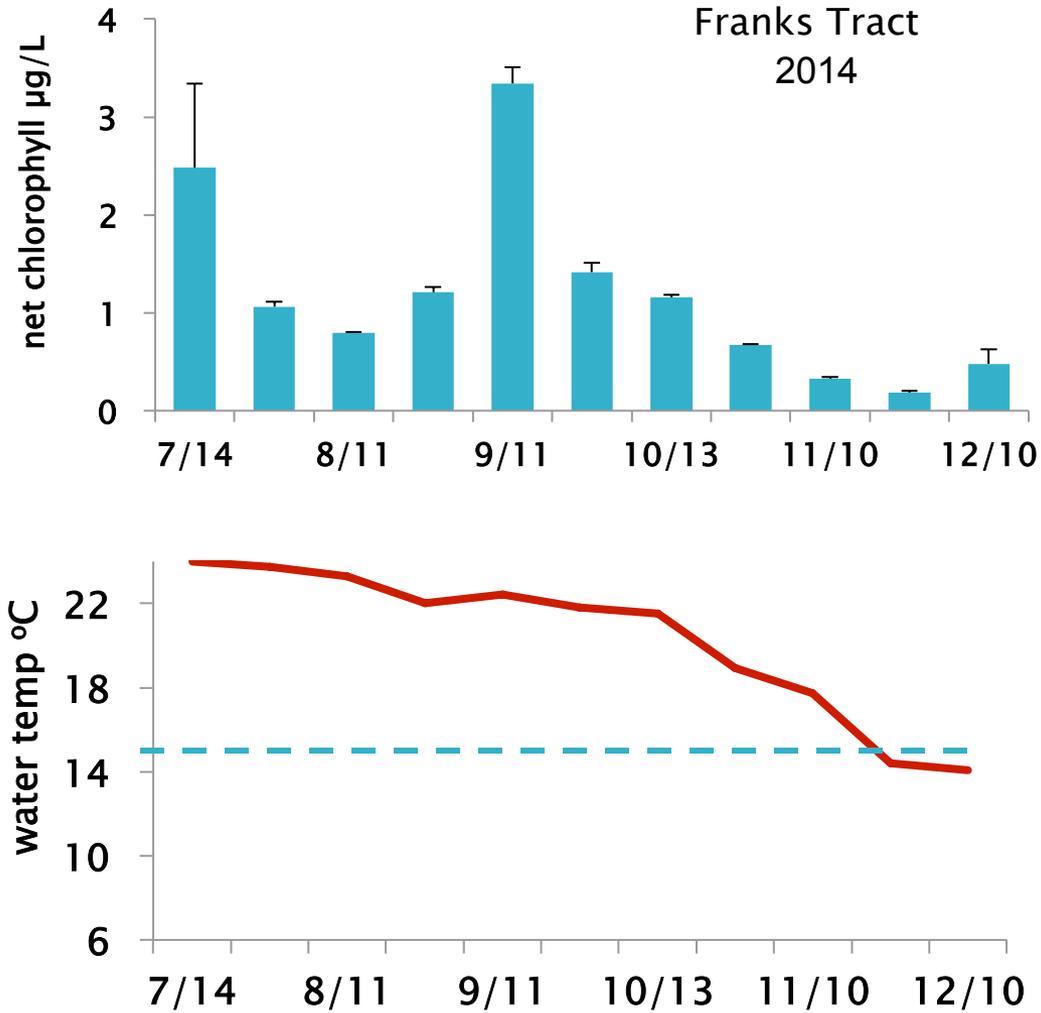
Causal Factors

Factors that promote *Microcystis*

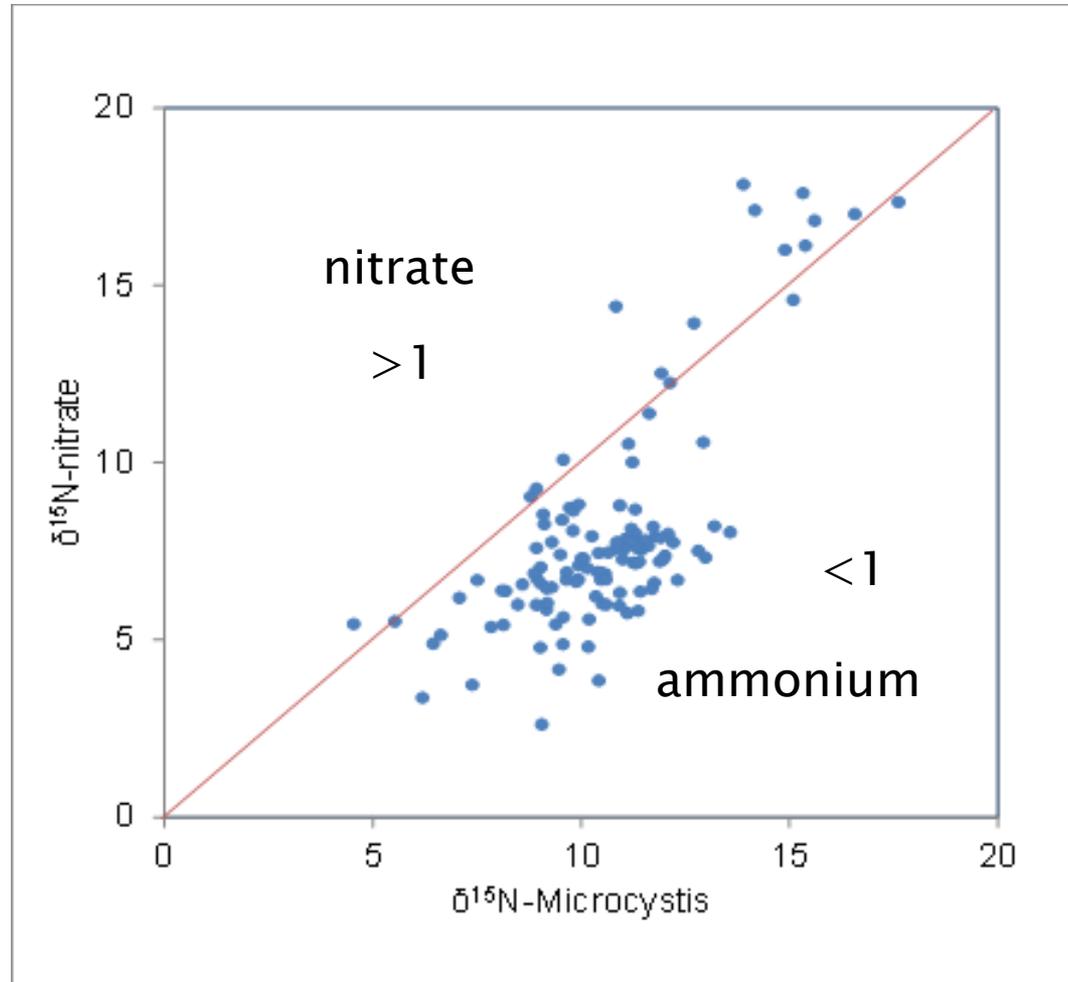
- ✓ • High nutrient concentration, particularly ammonium
- ✓ • Warm water temperature $>18^{\circ}\text{C}$
- ✓ • High light intensity
- ✓ • High residence time
- ✓ • Low turbulence – stratification



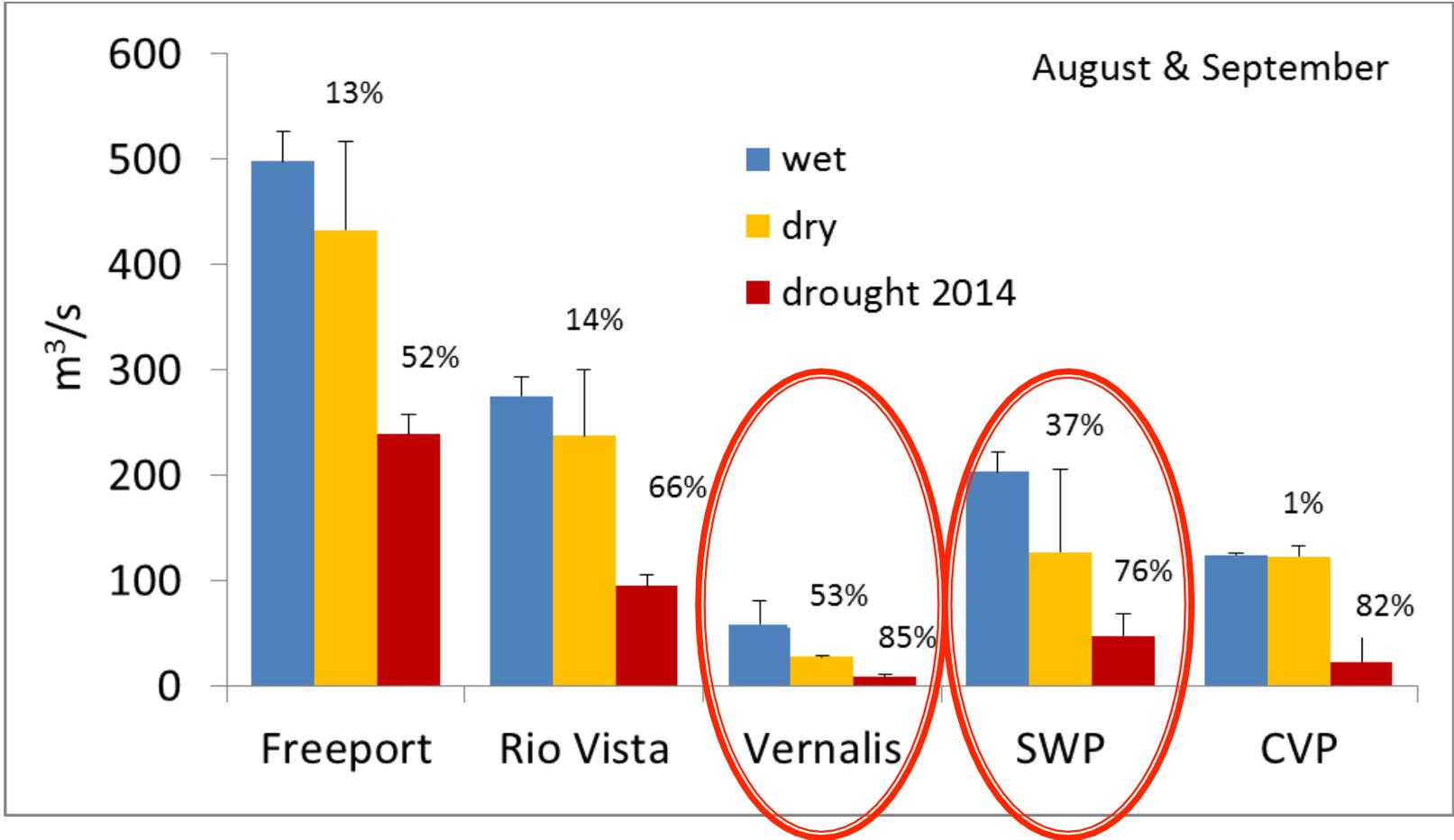
Water temperature



ammonium



Low streamflow

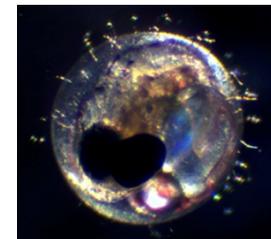
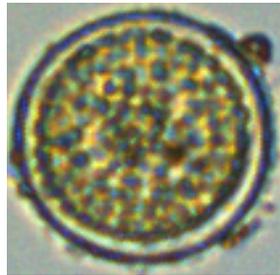


Controls

- increase streamflow
- decrease water temperature
- increase vertical mixing
- reduce nutrient concentration

Biological Impacts

- Phytoplankton community composition
- Zooplankton composition and survival
- Fish health and survival



Summary

- *Microcystis* occurs throughout the freshwater, brackish and marine regions of the Bay-Delta
- *Microcystis* increases with water temperature, nutrient concentration, residence time, and stratification, conditions common during drought
- *Microcystis* blooms adversely affect phytoplankton, zooplankton and fish biomass and community composition in the Delta
- Control measures have not been implemented or tested for *Microcystis* blooms in the Delta

