

Progress Report on UC Davis Research at Clear Lake

(The Lake Health and Water Quality Part)

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plus a host of researchers, students and technicians

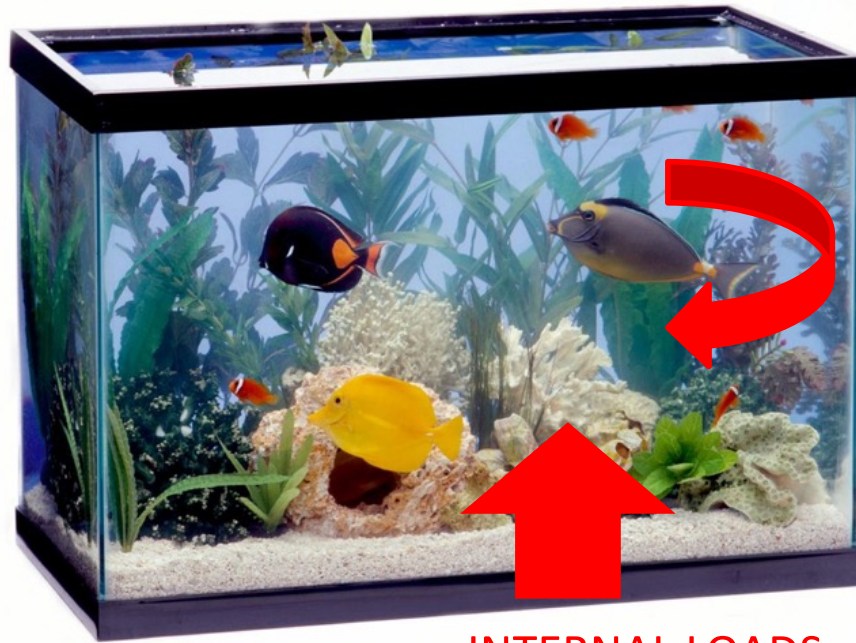
Clear Lake is the most complex lake in California

UC Davis has been asked to conduct the science upon which to base a recovery plan



WELCOME TO CLEAR LAKE!

EXTERNAL LOADS



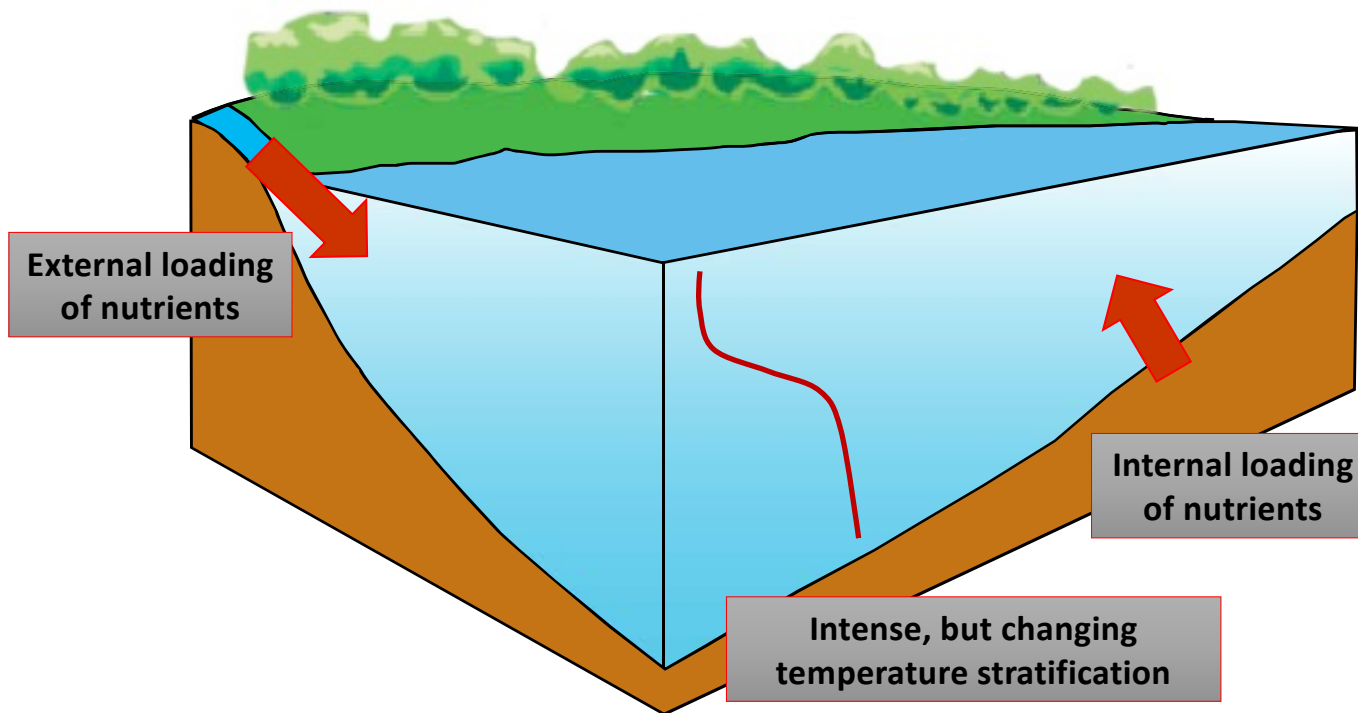
INTERNAL PROCESSES



INTERNAL LOADS

1. All three need to be known
2. Hypothesis: internal lake processes => internal loads > external loads
3. Measurement program + stakeholder data
4. lake modeling => explore viable solutions
5. Lake modeling => quantify the impacts of watershed actions, climate change,

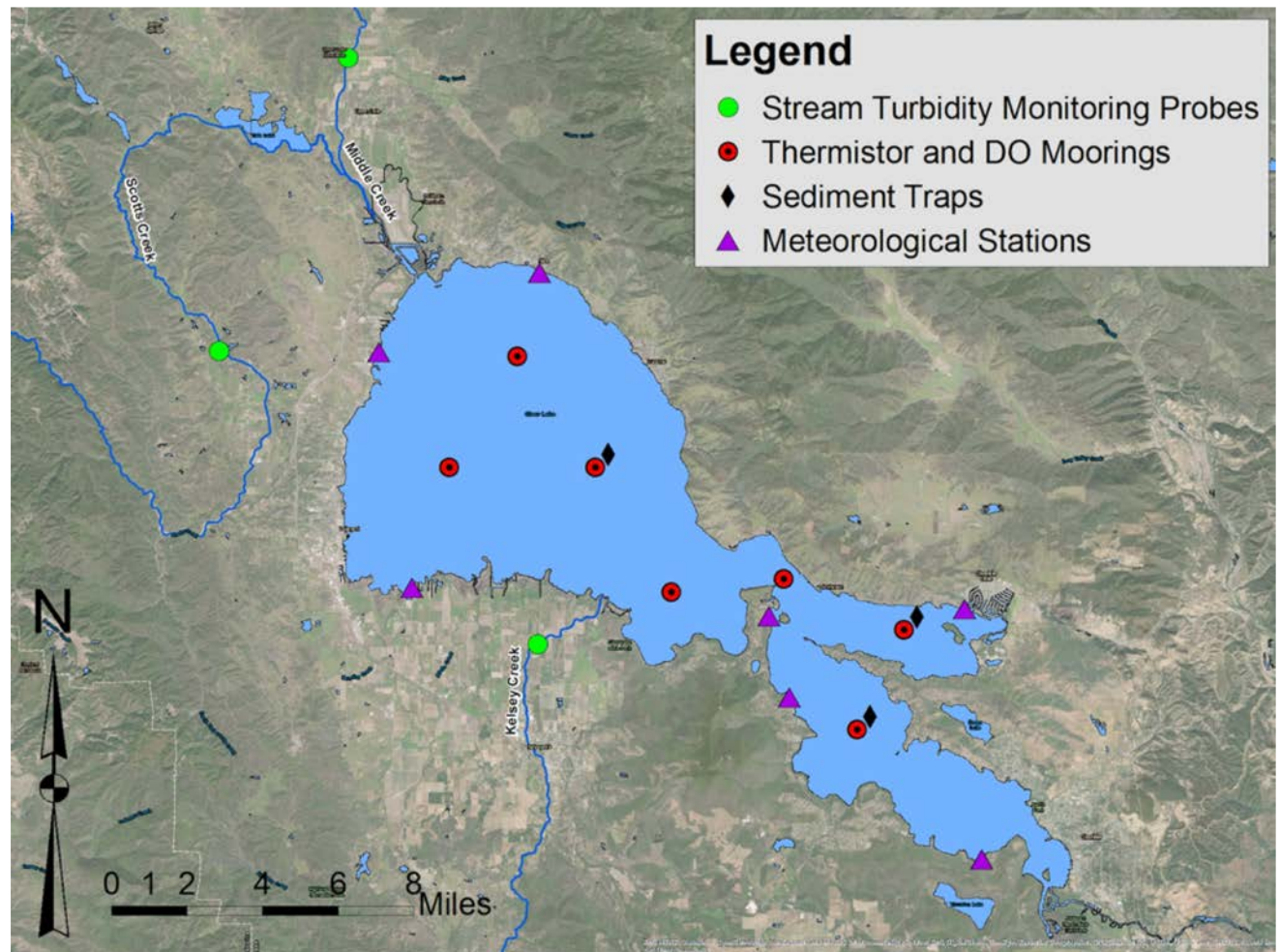
Fundamental Question - What drives eutrophication and blue-green blooms?





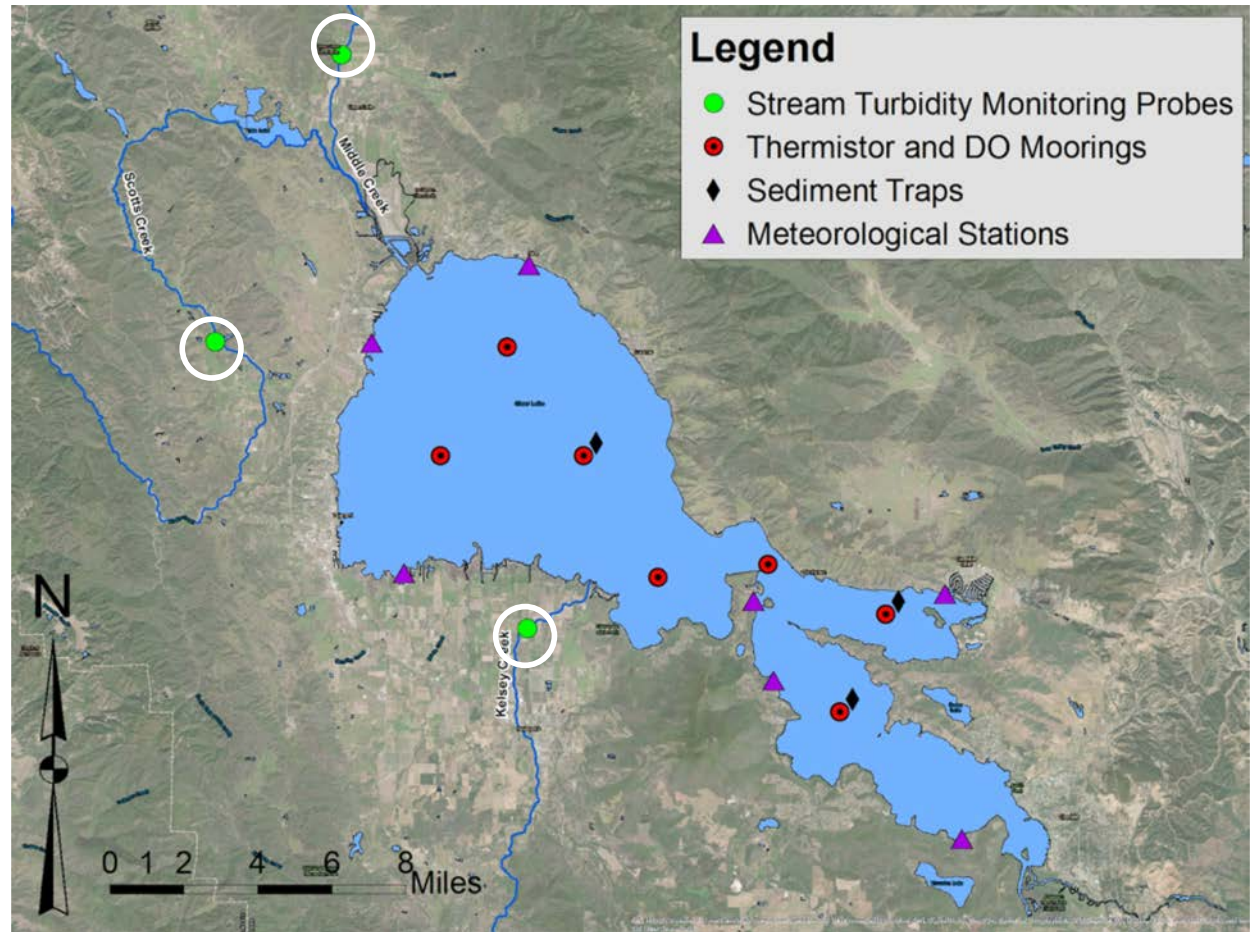
Lake Monitoring Network

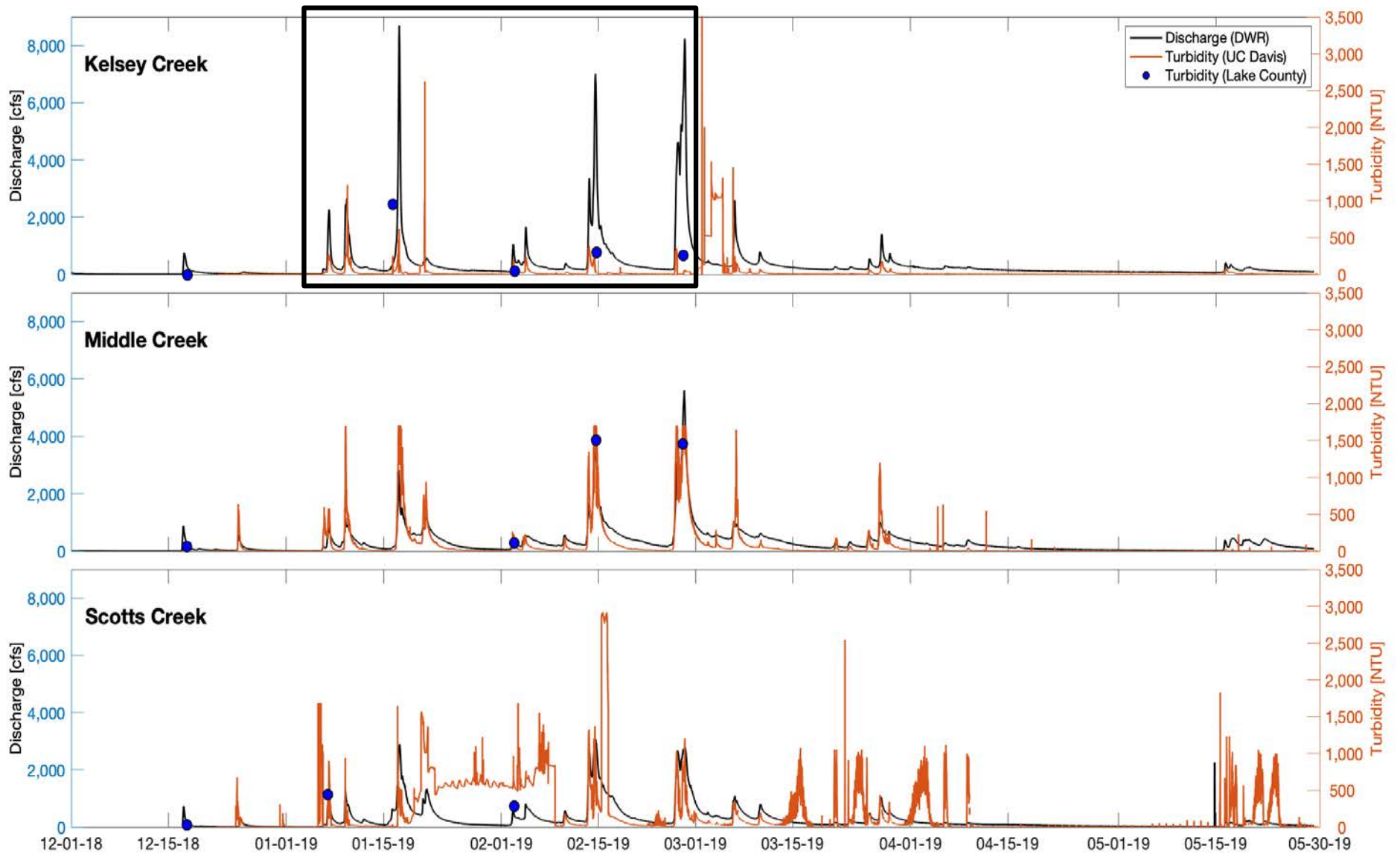
- Stream monitoring sites
- Lake moorings
- Sediment traps
- Meteorological sites

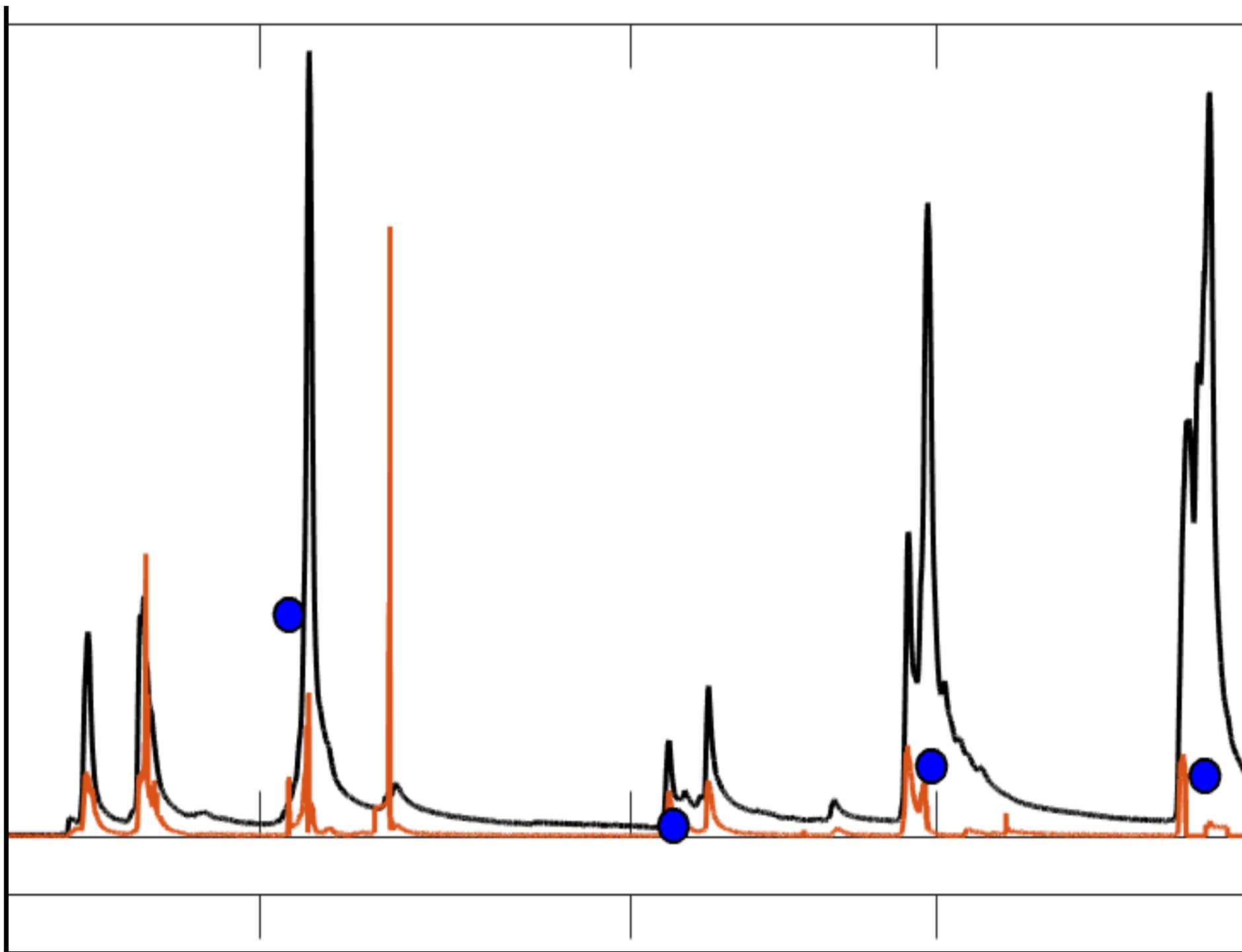


Stream Monitoring

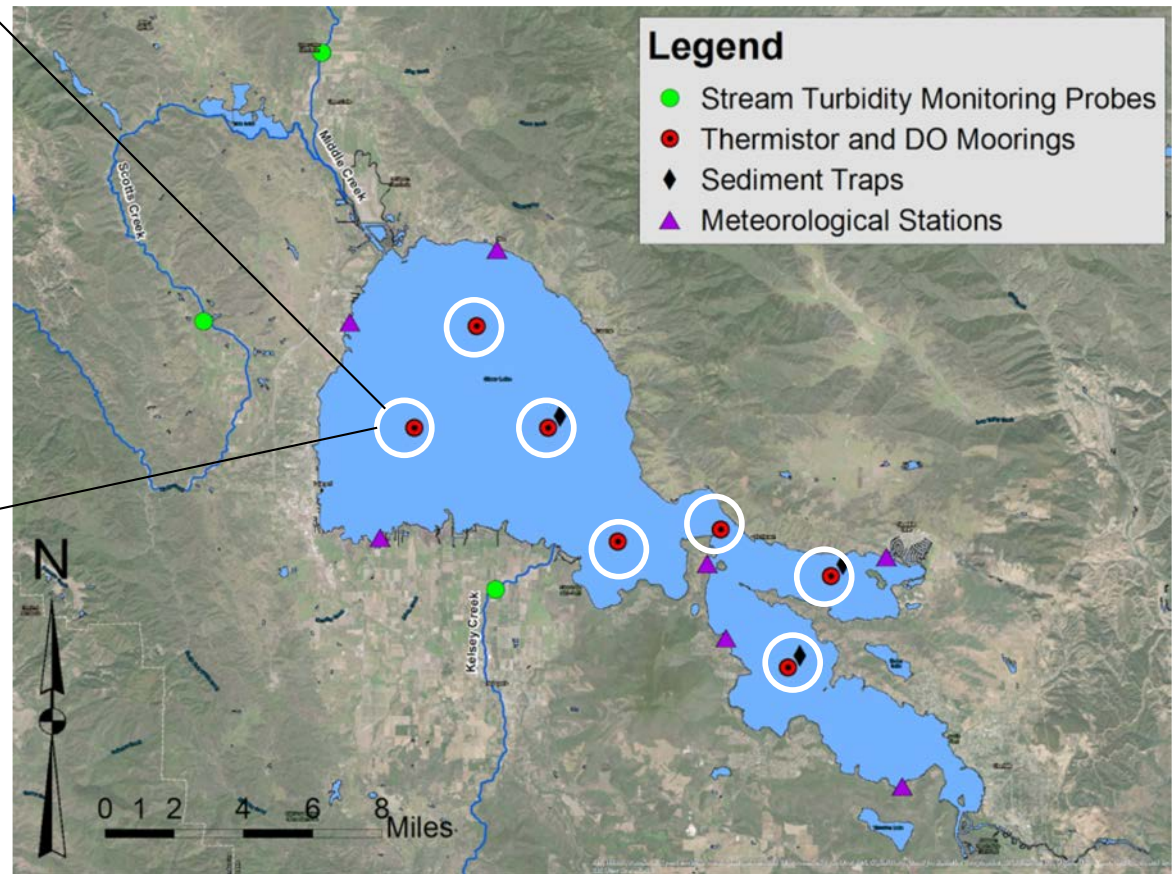
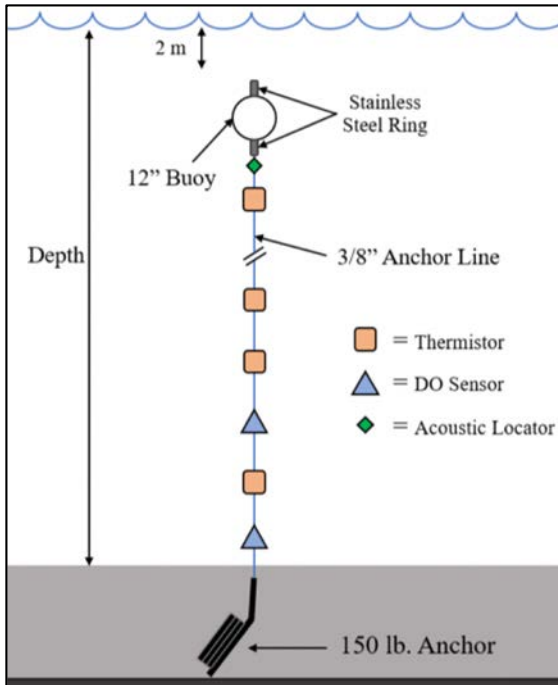
- In-situ optical turbidity sensors in primary tributaries to lake
- Used to estimate sediment and nutrient loading

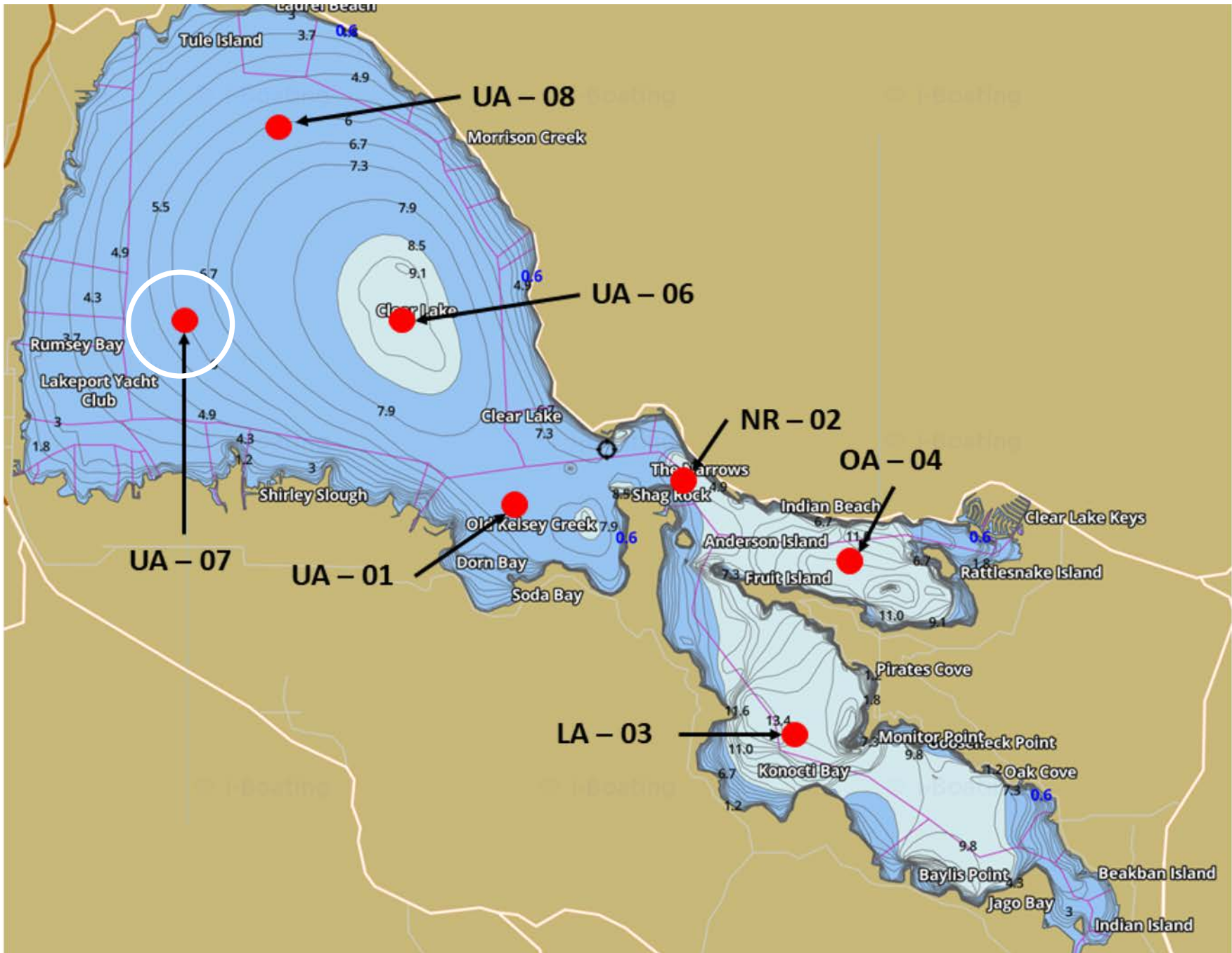




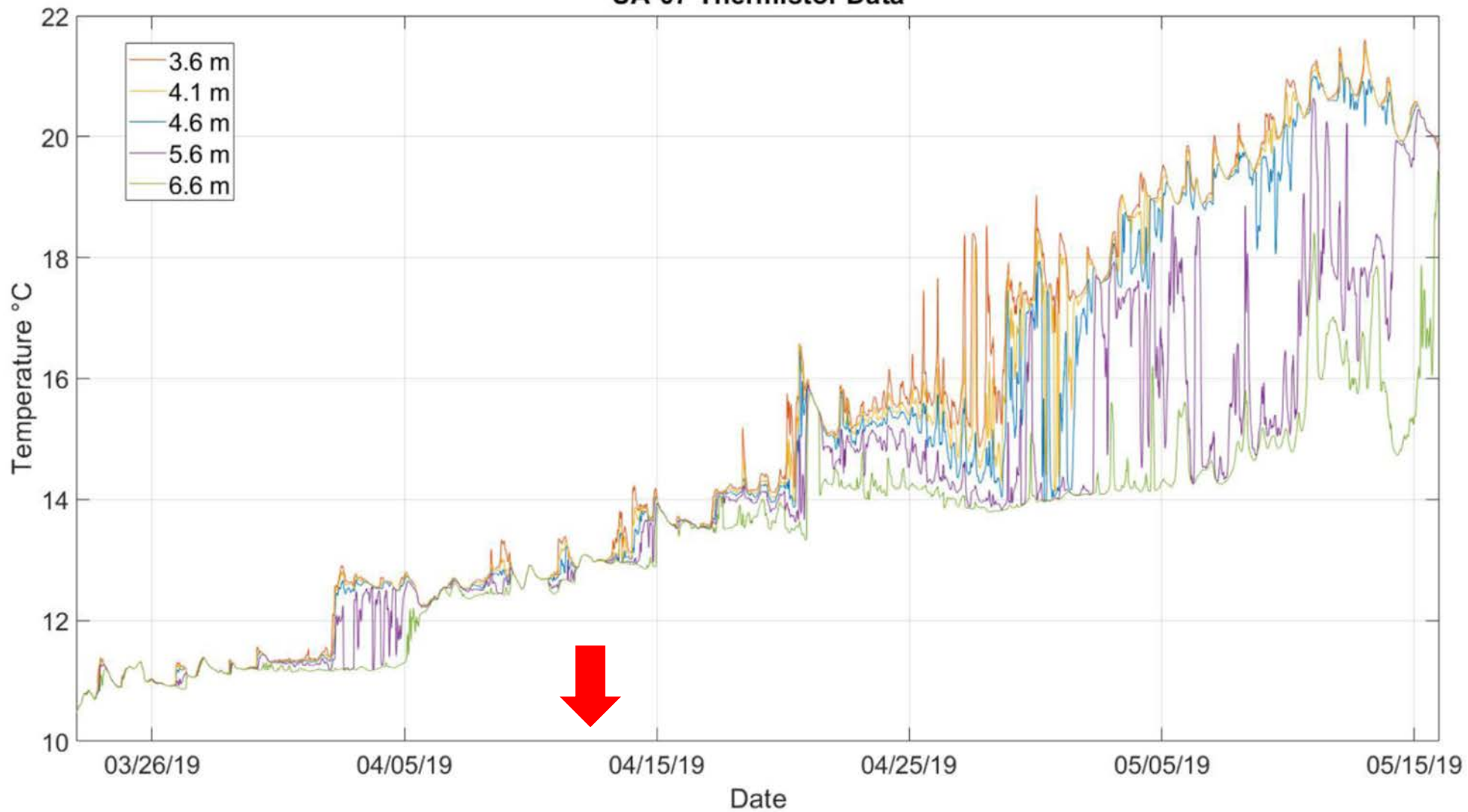


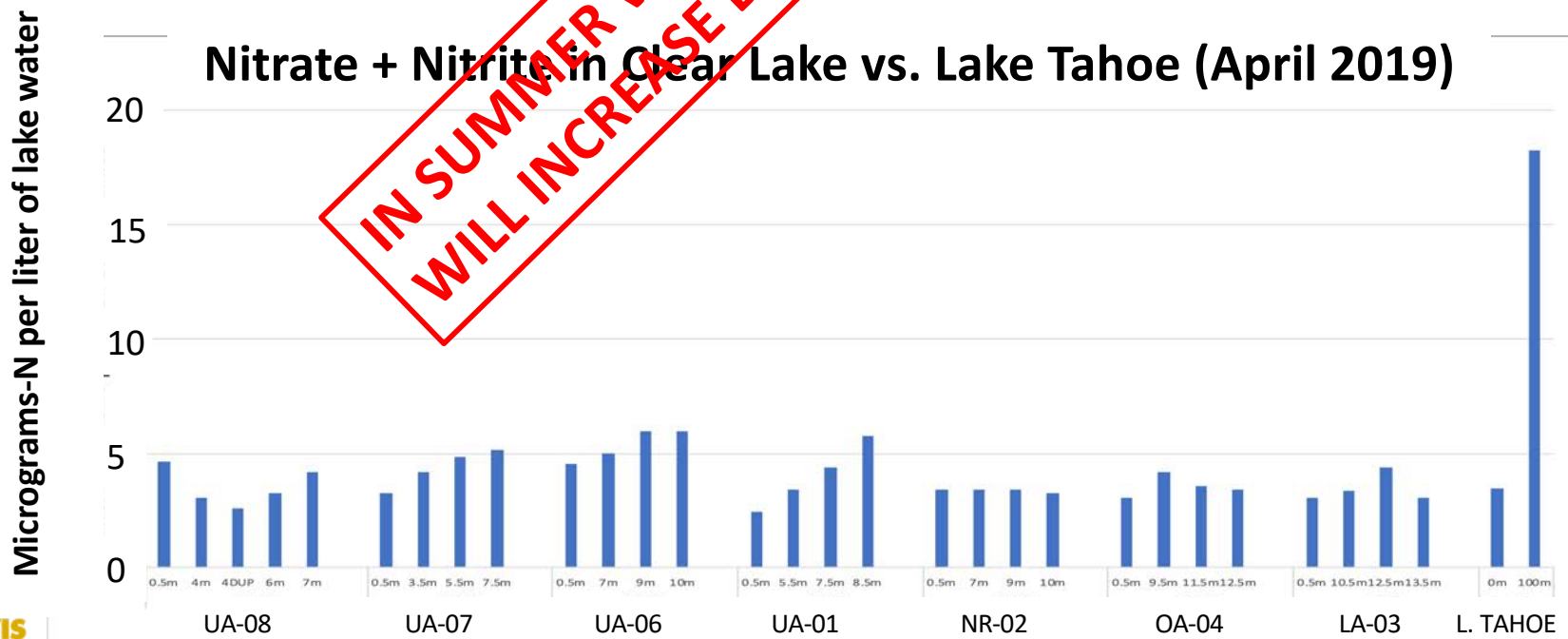
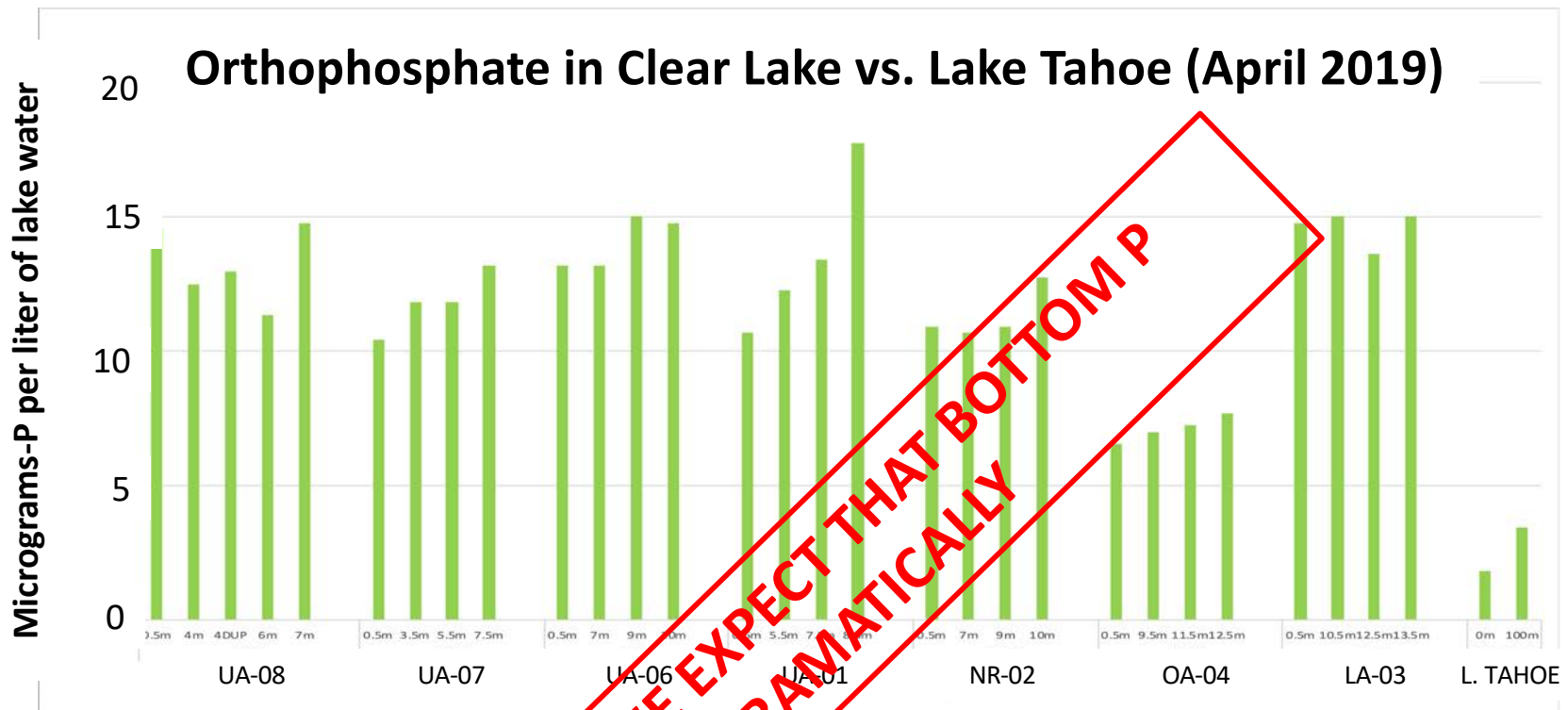
Lake Moorings





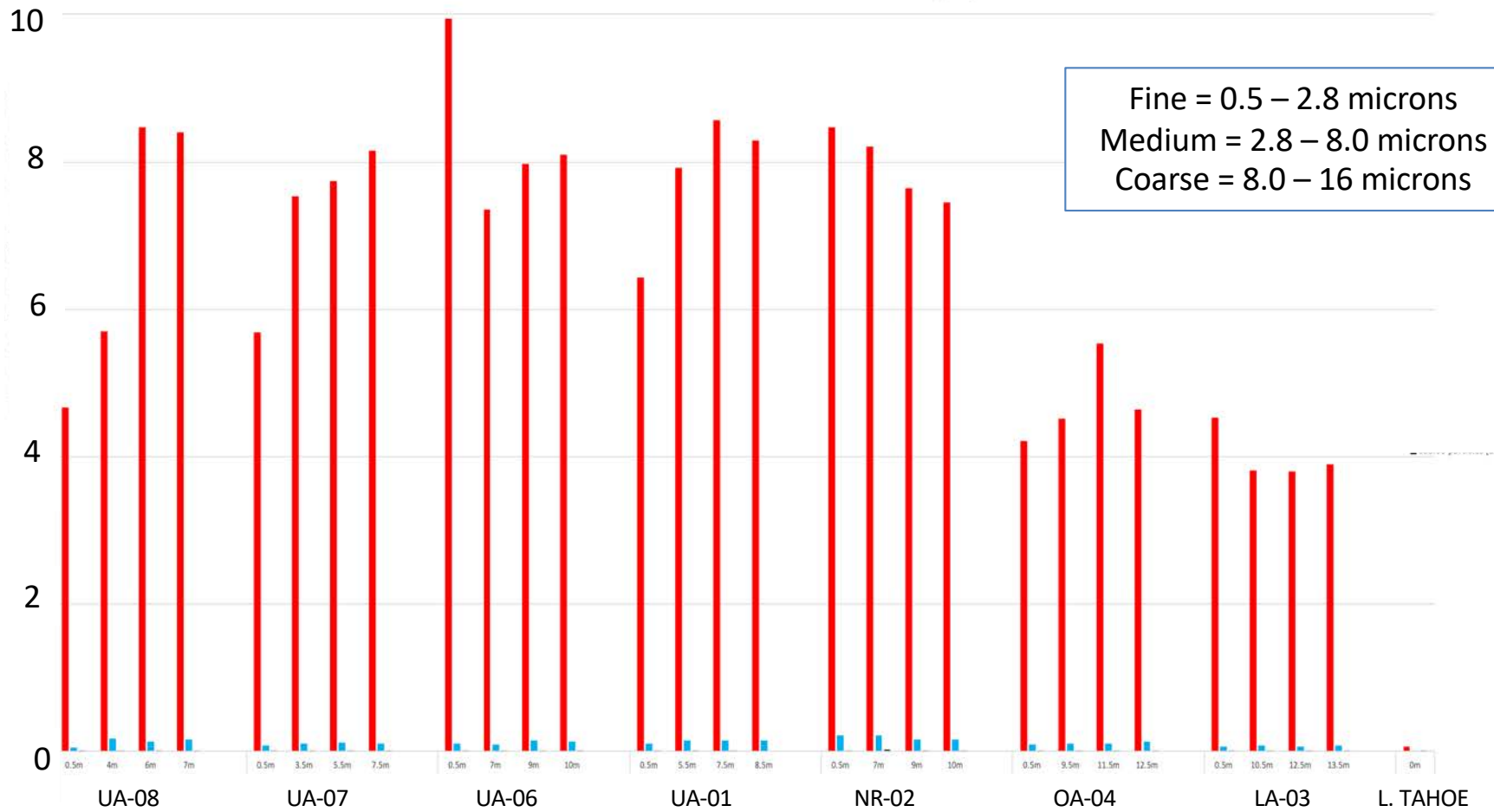
UA-07 Thermistor Data



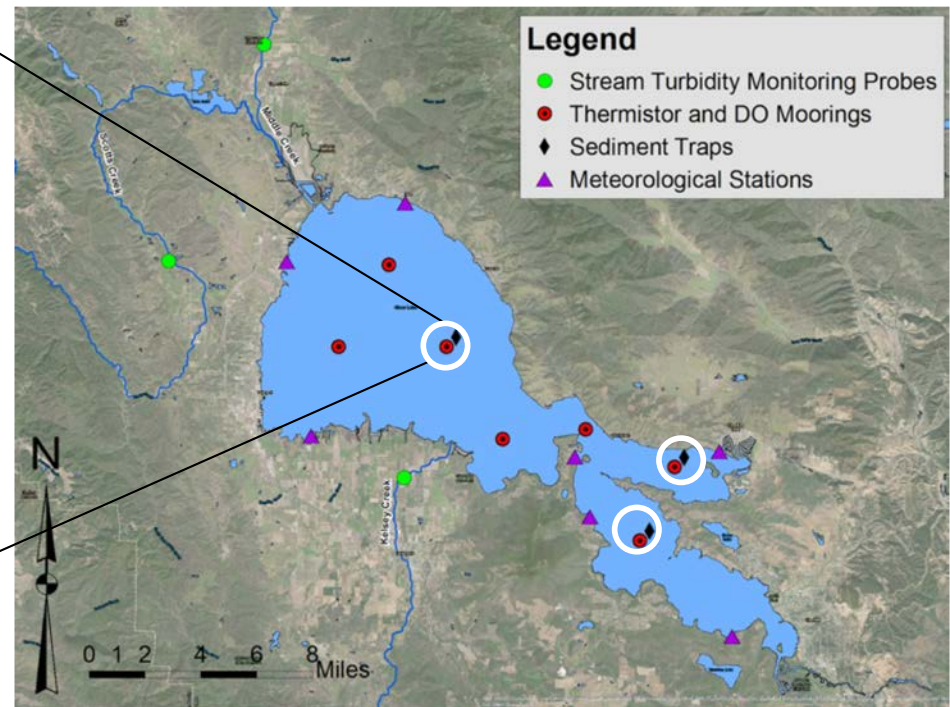
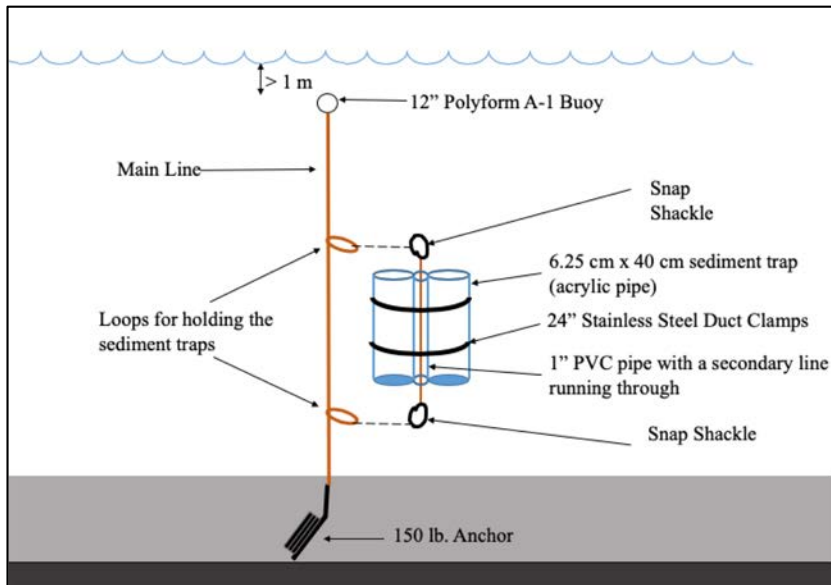


Fine, Medium and Coarse Suspended Particles in Clear Lake vs. Lake Tahoe (April 2019)

Millions of particles per milliliter of lake water



Sediment Traps



New studies of lake sediments

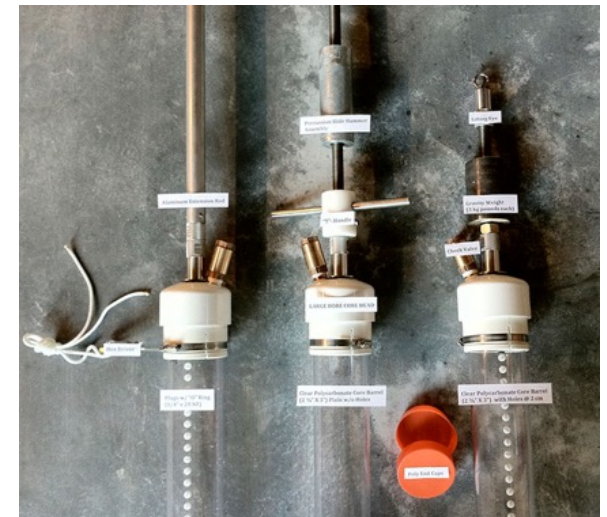
Sediment Traps

- Quantify sedimentation rates
- Analyze particle size distributions
- Characterize carbon, nitrogen, and phosphorus content of sediments



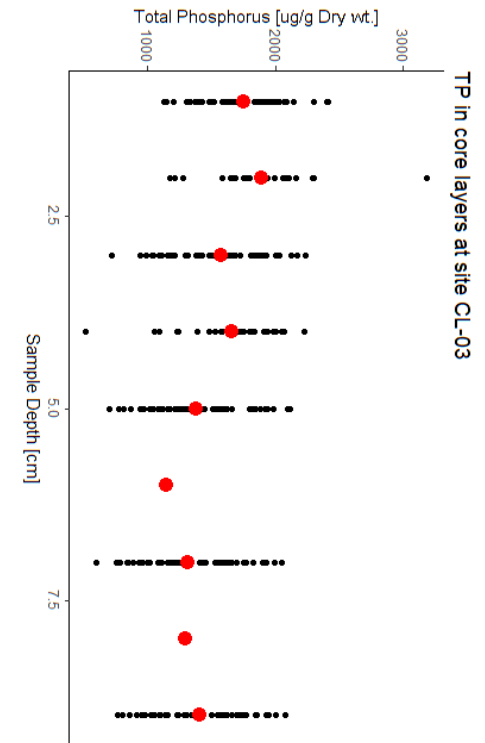
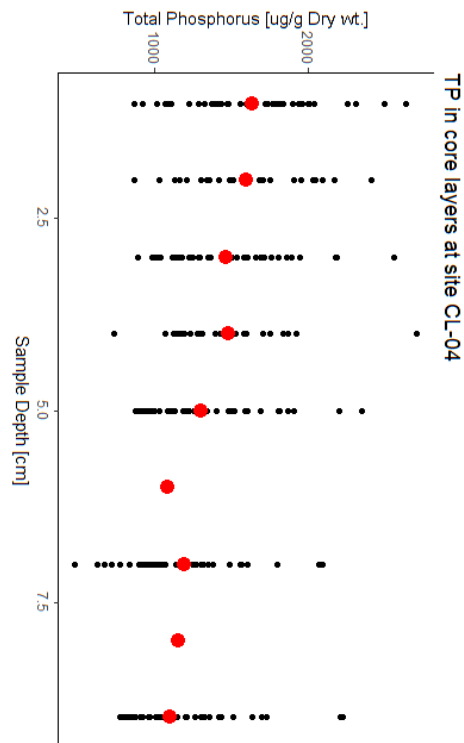
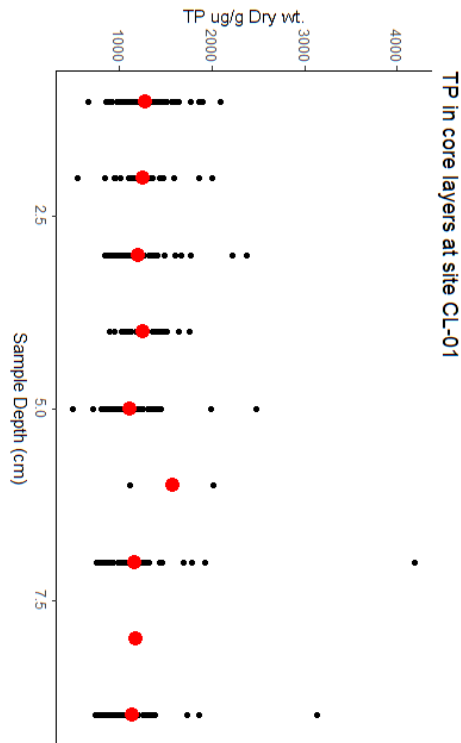
Sediment Incubations

- Quantify P-release rates under different oxidative conditions
- Characterize spatial and temporal variability in P-release
- Model internal P-loading from sediments

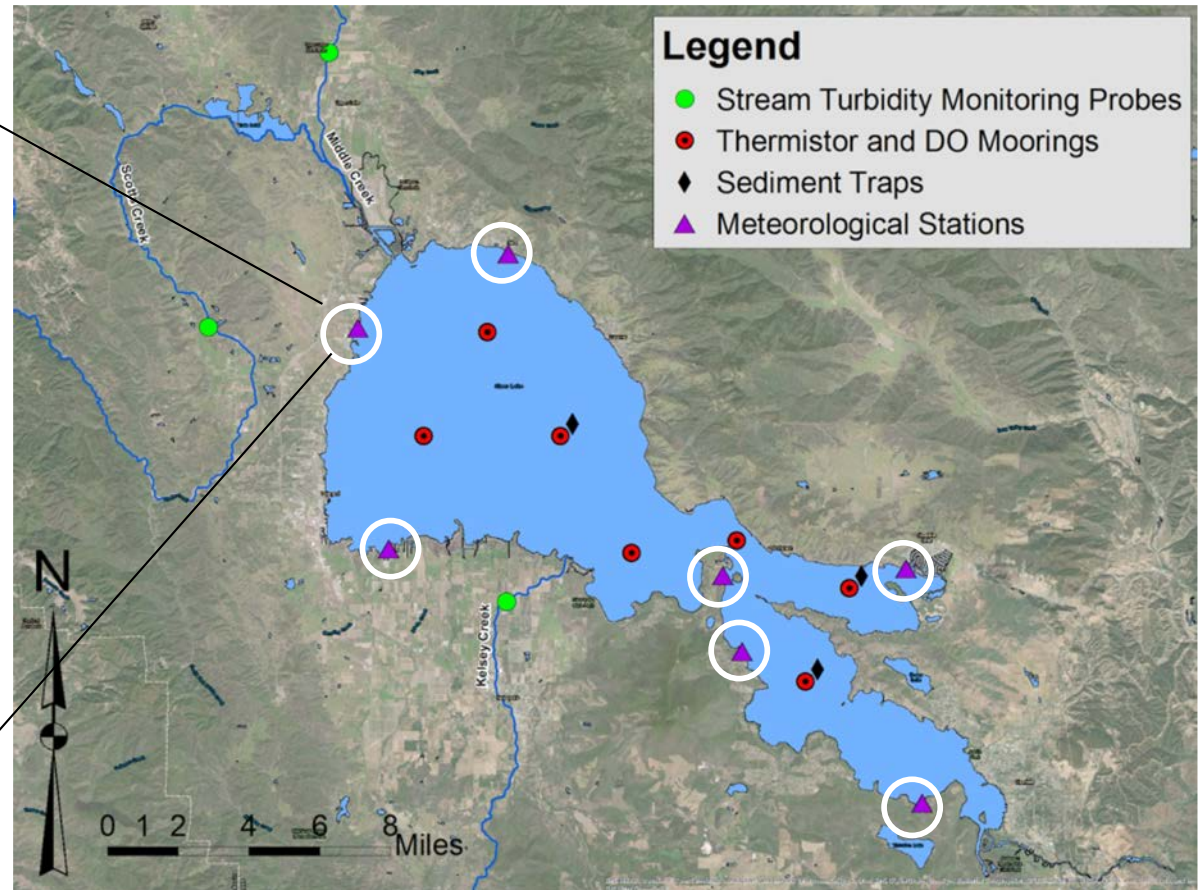


Assessment of P-sampling methods

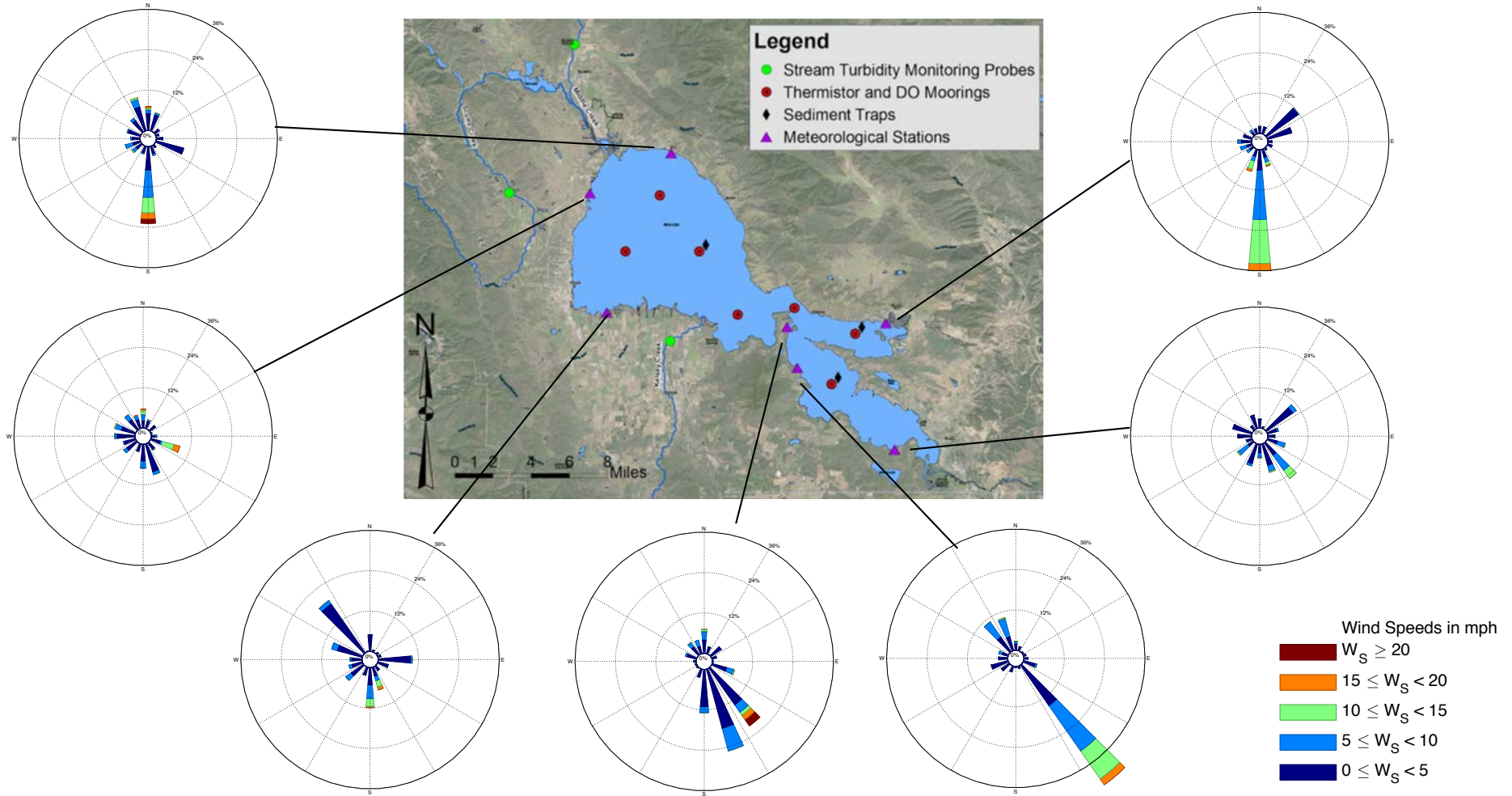
Characterize vertical distribution of different P-fractions in sediments and advise Lake County regarding current sampling approach (other fractions not shown: loosely bound, Ca-bound, Fe-Al-bound, and residual)



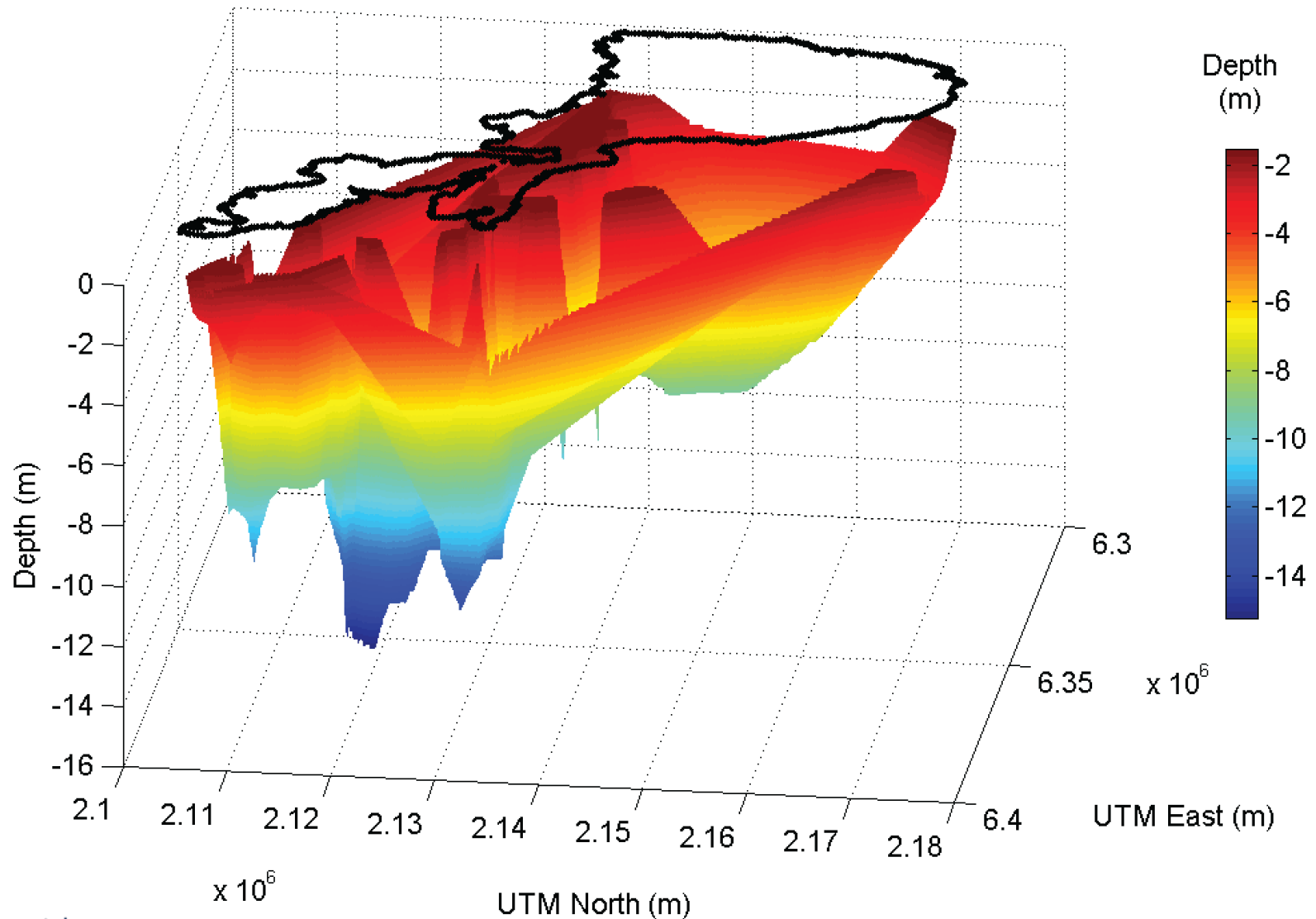
Meteorological Sites



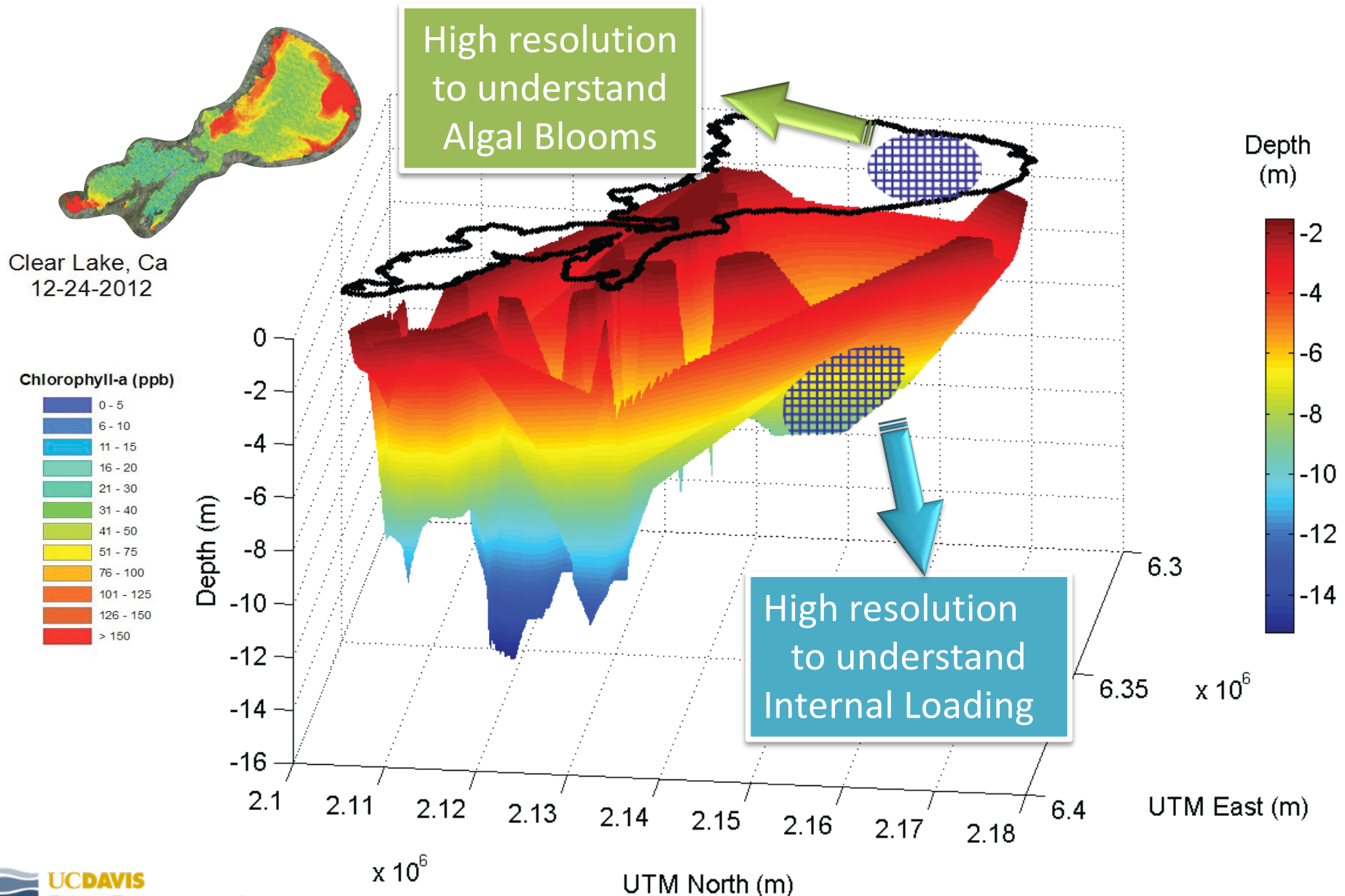
Variability in Wind Forcing



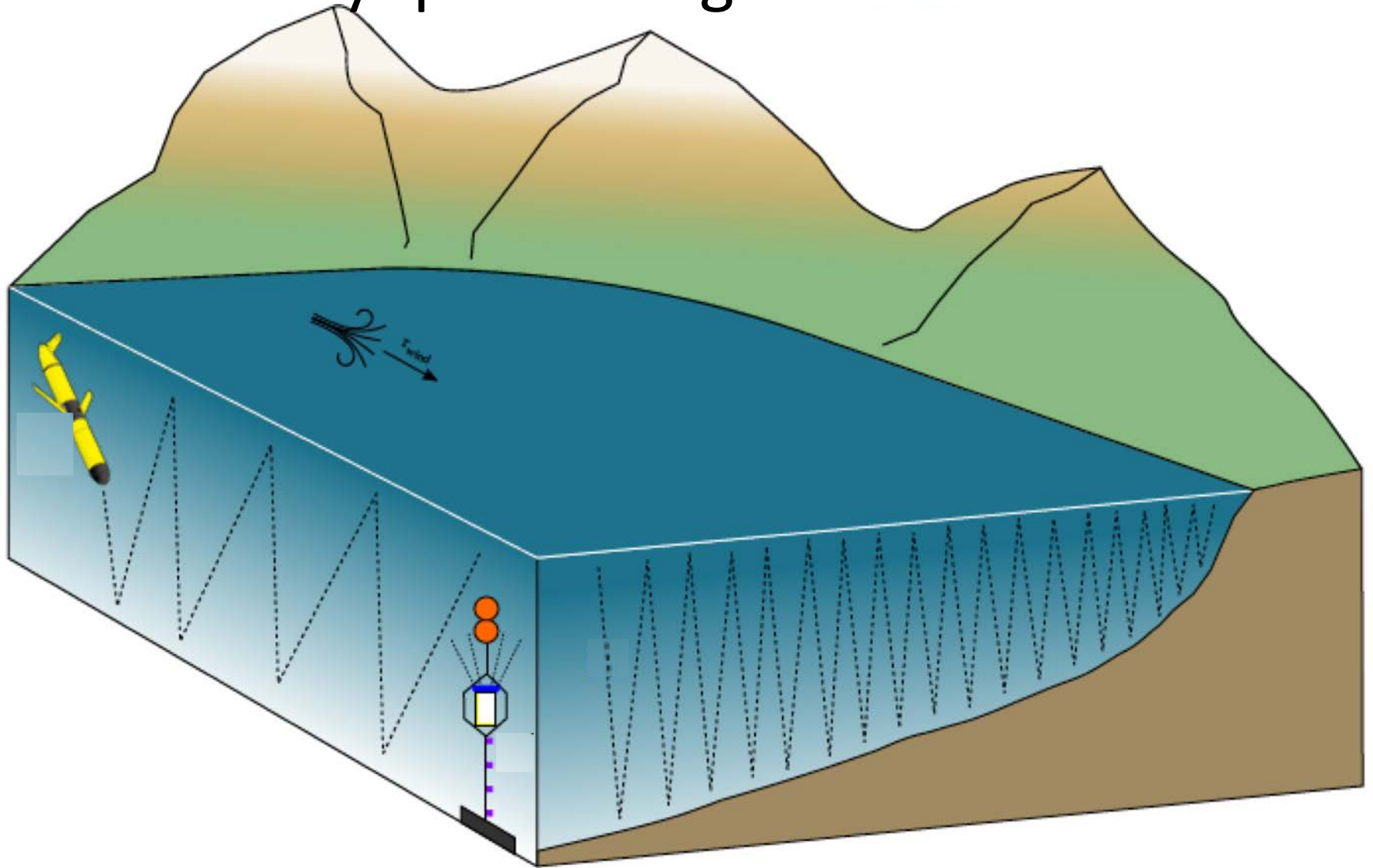
3-D Hydrodynamic + WQ model



3-D Hydrodynamic + WQ model



Advanced Instrumentation – to be deployed as the key questions get better defined



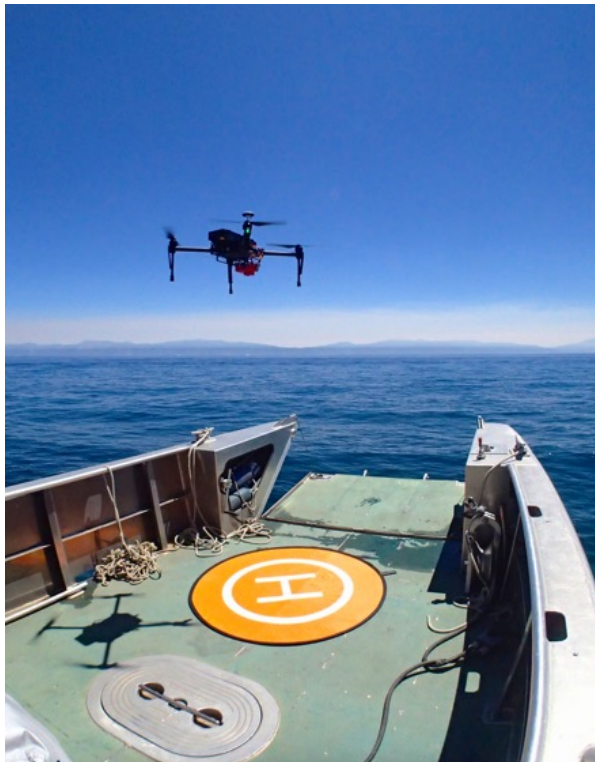
GAVIA AUV



SLOCUM GLIDER



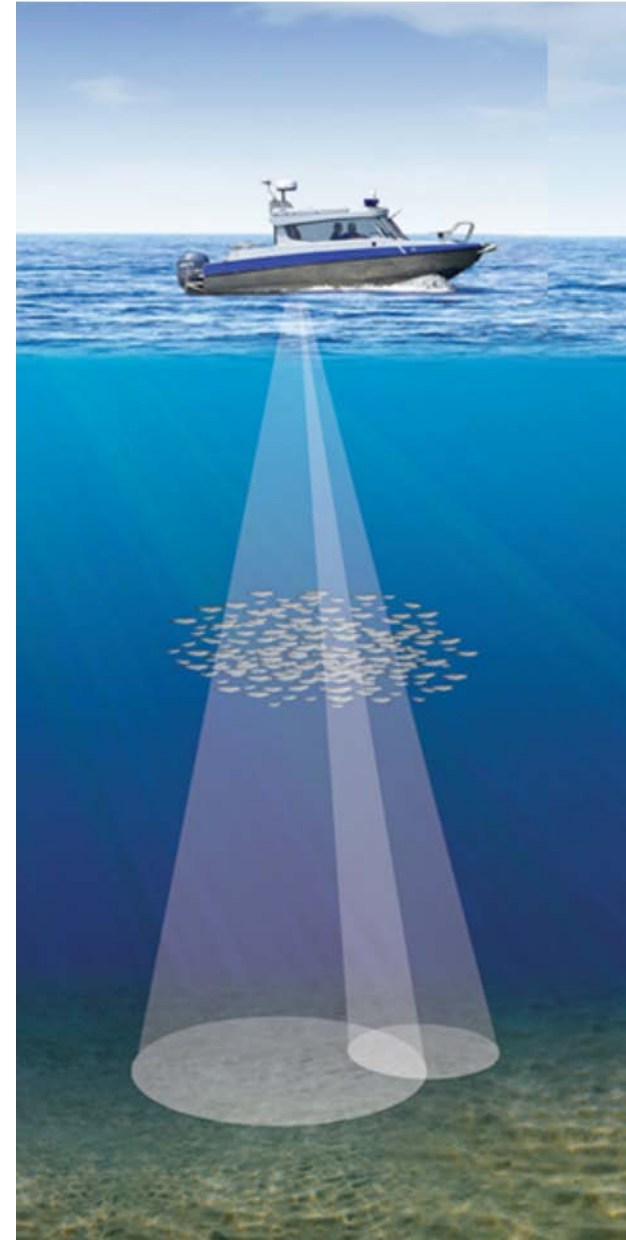
SATELLITES, HELICOPTERS, DRONES



EDGETECH COMBINED BATHYMETRY and SIDE SCAN SONAR



BIOSONICS SCIENTIFIC ECHOSOUNDER

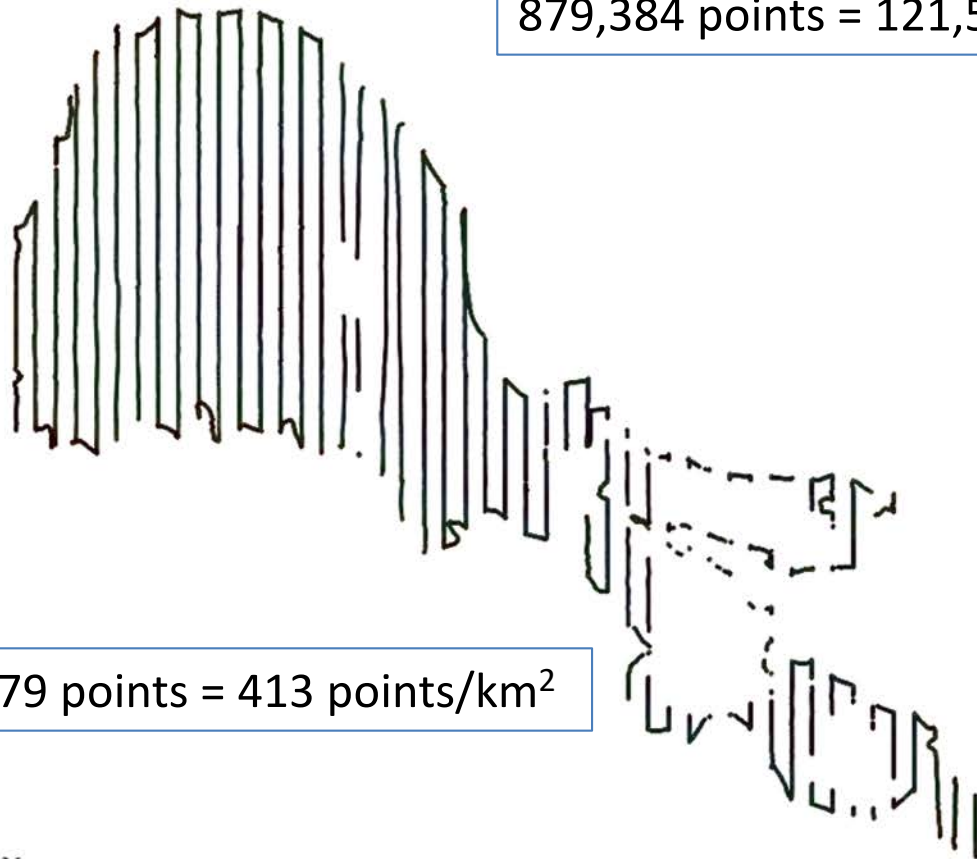


CURRENT TRACKING IN THE OAKS ARM, 1997



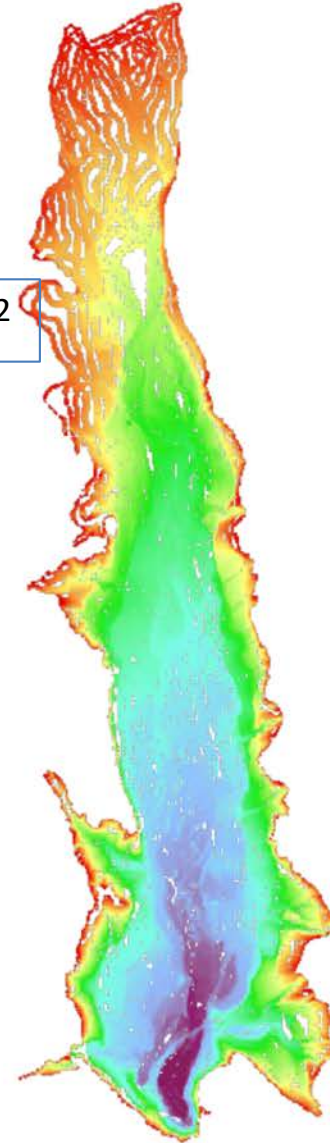
BATHYMETRY – A MAJOR DEFICIENCY

Clear Lake
(Area 160.4 sq km)
Bathymetry by ReMetrix
(Aug-Sep 2002)

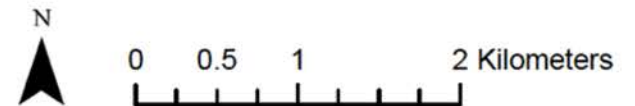
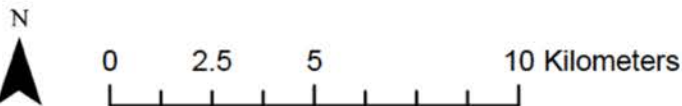


66,279 points = 413 points/km²

Indian Valley Reservoir
(Area 15.2 sq km)
Bathymetry by UC Davis
(November 2018)



879,384 points = 121,513 points/km²



GREATLY APPRECIATE THE DATA SHARING
AND SPIRIT OF COLLABORATION WITH
THE COUNTY, DWR, THE TRIBES, USGS,
PAST CLEAR LAKE RESEARCHERS, PRIVATE
CITIZENS...



THANK YOU