

Utah Lake Water Quality  
Study  
Science Panel Meeting  
March 11-12, 2019  
Salt Lake City, UT

## Analysis Plan

Utah Lake Nutrient Criteria  
Development Technical  
Support



# Objective

- We're tasked with helping compile new data and conducting analyses to support the Science Panel.
- Goals:
  - Help quantify conceptual model linkages
  - Address data/information/knowledge gaps
  - Especially in light of charge questions
- Get feedback on analysis plan ideas
- Continue to refine analysis plan

# Identifying important questions

- We used existing documents and input from last meeting
- Evaluated what we think we can do with existing data
- Do not repeat what the Explorer already has

## 1. What was the historical condition of Utah Lake with respect to nutrients and ecology pre-settlement and along the historical timeline with consideration of trophic state shifts and significant transitions since settlement?

### Needed Studies:

- Paleo study to look at historic conditions (did macrophytes exist?) and changes in composition and abundance of numerous taxa and nutrients
  - Estimate production of algae and macrophytes
  - NOTE: Possible method: Use sediment paleo studies to get at phytoplankton vs submerged macrophytes

### **Sub-question #1.1: Diatom community and macrophyte community in the paleo record**

#### UDWQ Work in Final Phase 1 Report:

- Not included in Phase 1 report

#### Data Needs:

- A (4-5 page) summary of what is available in the literature on diatoms
- Geolocations of historic sightings of macrophytes

#### Available Data:

- [Rushforth](#) data (working to secure)

#### Available Utah Lake Literature:

- Pull from Literature Review
- Several studies included in the Utah Lake literature review:
  - (p. 7) ([Bolland, 1974](#); [Javekul, Grimes, and Rushforth, 1980](#); and [Bushman, 1980](#)) analyze sediment cores for evidence of changing lake conditions. [Bolland](#) demonstrates a shift in the diatom community caused by changing macrophyte and water clarity.

#### Available Primary Literature:

- Included in the Technical Support SOW

#### Water Quality Model Information:

*Draft*

*August 24, 2018*

### **Attachment A**

#### **ULWQS Science Panel Ideas for Studies, Experiments, and Literature Reviews From August 2018 Science Panel and Joint Meetings**

#### **Study Objectives**

- Understand the Utah Lake-specific relationship between nutrient availability and the frequency of HABs?
  - How much do nutrient concentrations need to be reduced to reduce the frequency of HABs?
- Understand what the effect of carp removal is on:
  - Macrophytes
  - Turbidity
  - Sediment and nutrient resuspension
- Understand the equilibrium concentration of phosphorus at the sediment-water interface (in the sediments, pore water, and water column)
- Identify the equilibrium concentration of phosphorus at the sediment-water interface once nutrient reductions occur (new/future condition)
- Identify the nutrient concentration thresholds/tipping points for HABs
- Understand the biology of Utah Lake
  - Patterns of phytoplankton and zooplankton
- Understand the dynamics of diatoms in Utah Lake

#### **Needed Analyses of Existing Data**

- Depiction of the seasonal succession of phytoplankton and zooplankton.
  - What is the typical pattern of phytoplankton and zooplankton, how do they wax and wane?
    - The biology of the system is relatively unknown to the SP
- Phase 1 Report
  - Need to beef up the biology component of the Phase I Report
  - Modify loading data to show concentration of nutrients and water flow
  - Present % of biovolume of cyanobacteria in addition to the cell counts because cell volume varies between species.

# Walk Through Analysis Plan Ideas

## Next Steps

- Continue to refine Analysis Plan with your input
- Finalize
- Execute – report back - iterate