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

Uncertainty Guidance

Utah Lake Nutrient Criteria Development Technical Support

UTAH DEPARTMENT *of*
**ENVIRONMENTAL
QUALITY**

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Background

- Charge to SP: characterize scientific uncertainty including confidence of scientific findings and quantified measures of uncertainty with respect to answers to the charge questions.

- What is the process for quantifying uncertainty?
  - For different lines
  - For synthesis across lines
 - In communicating SP statements

Goal

- Introduce concepts for consideration

- Have a discussion that will begin a process

- Ultimately: develop an uncertainty guidance memo to capture the consensus

Problem

- How best to quantify and communicate uncertainty around various lines of evidence (empirical, process model, reference and literature), in responses to charge questions, and in recommending criteria.

Empirical Lines

- Traditional and common approaches
- Probabilities, confidence, etc.
- Can we develop guidelines or minimum standards?
- Combining across evidence empirical data?
- Meta-analytical approaches?
- What would the panel recommend at a minimum?
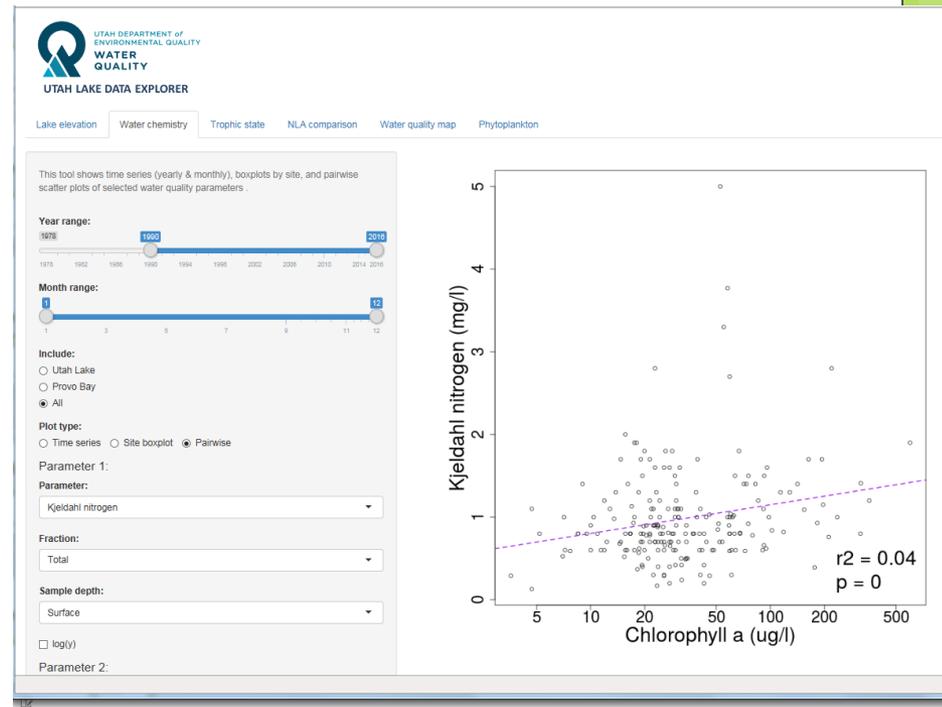
Reference

- Likely follow empirical requirements?
- How to communicate confidence in historical recreation?
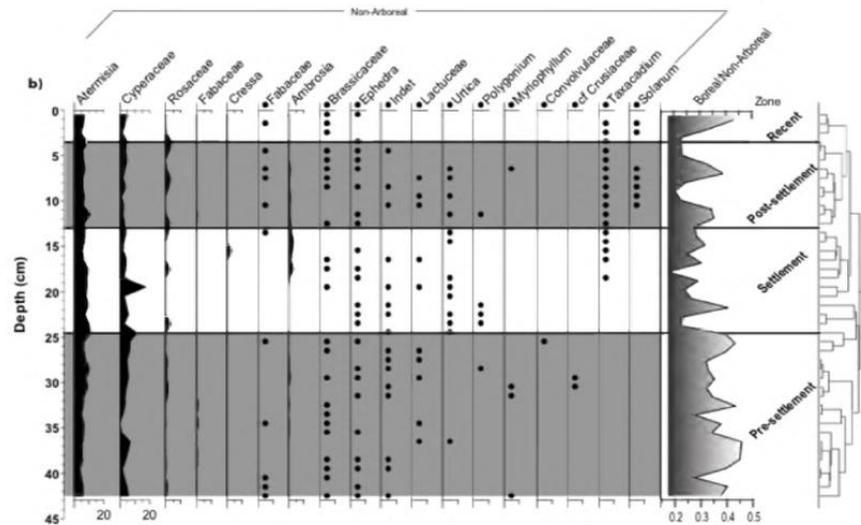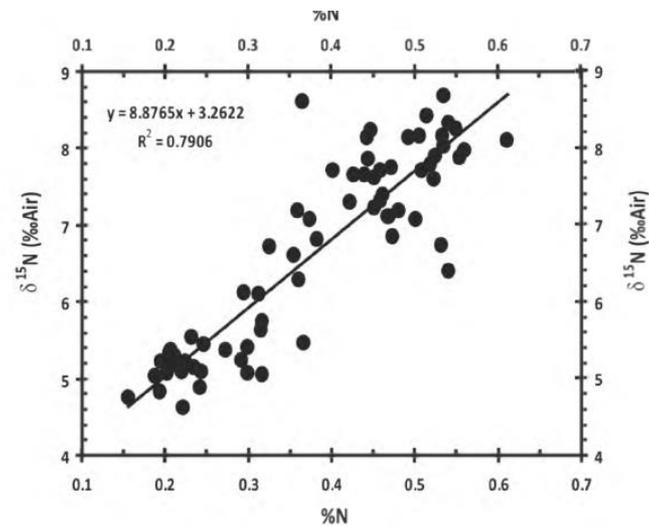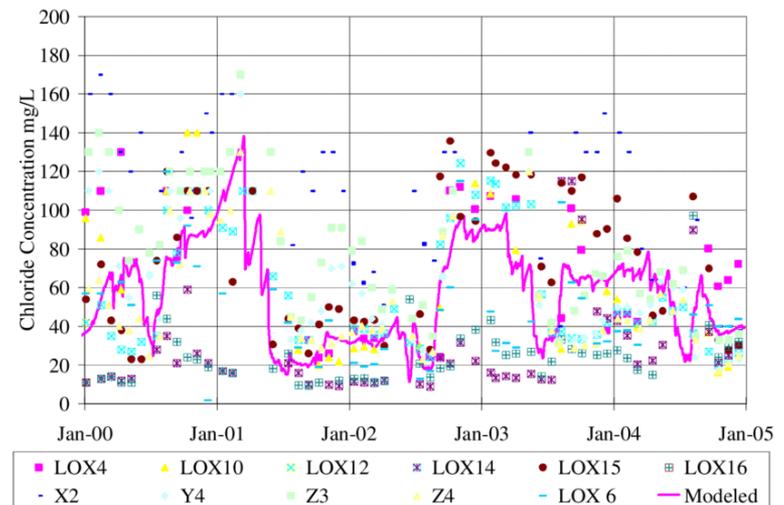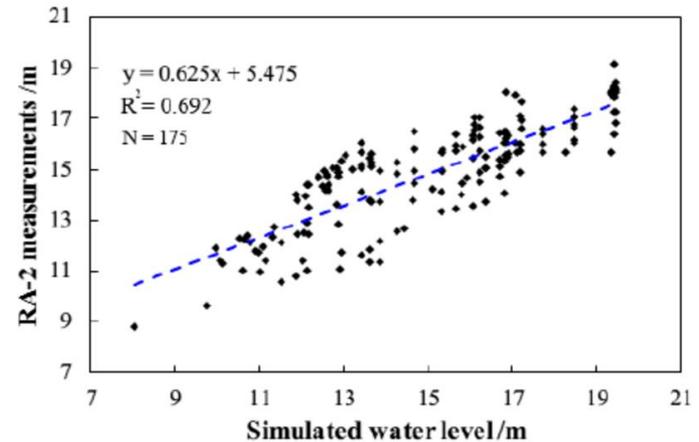- What would the panel recommend as a minimum?

Figure 27. Continued

Macharia 2012

Mechanistic Models

- Corroboration (validation); Robustness
- Sensitivity Analysis
- Uncertainty Analysis: model framework, model input, model niche
- What would the panel recommend as a minimum?

Literature

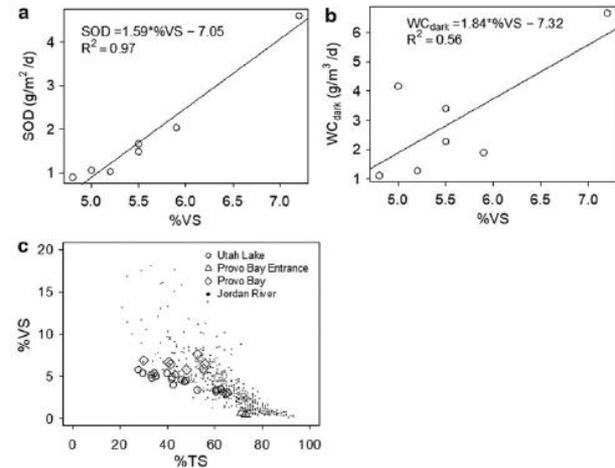- Likely need to track the recommendations for whatever line they reflect.

The Role of Internal Nutrient Cycling in a Freshwater Shallow Alkaline Lake

Mitch Hogsett,[1] Hanyan Li,[2] and Ramesh Goel[2,*]

[1]Forsgren Associates, Salt Lake City, Utah.
[2]Department of Civil & Environmental Engineering, University of Utah, Salt Lake City, Utah.

Combining Information

- Combining empirical, reference, model, and literature
- E.g., what were historical nutrient conditions? A concentration of x u/gL will protect aquatic life?
- IPCC:
  - Type, amount, quality and consistency of **evidence**; degree of **agreement**; **traceable account (level of understanding)**
  - Communicate **confidence** (not statistical) based on agreement and amount of evidence
  - Communicate a **likelihood** for any response given the causal input, to extent practicable

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- How would you like to proceed? What are elements?

Mastrandrea et al. 2010

What else?

- What other elements of uncertainty discussion are we missing?

Johari Window

	Known to self	Not known to self
Known to others	Arena	Blind Spot
Not Known to Others	Façade	Unknown

Next Steps

- Take initial input, develop a draft plan
- Walk it by you all again