GOALS

Review Document Updates

Finalize Document
Feedback from December Meeting

Additional internal DWQ Review

Revised version sent
EDIT SUMMARY

- General formatting
- Added a great deal more information tying assessment endpoints to management goals
- Amended language to clarify contingent vs committed actions
- Updated the mechanistic model language – incorporating James’ presentation
- Added language that commits funded studies to this structure
- Added language that commits model team to this structure
- Added language to facilitate SP uncertainty discussions
GOALS

Review Document Updates

Finalize Document
PROCESS

Feedback from December Meeting

Additional internal DWQ Review

Revised version sent
EDIT SUMMARY

- General formatting
- Reconcile with the criteria setting regulatory process
- Management goal/assessment endpoint/measure of effect language
- Adding pH as an assessment endpoint
- New language on constraints of S-R modeling for single system
- New language on frequency and duration
- Clarify state change challenge – and roles of SC and SP
- Added a few new citations
- Clarify stringency rule with criteria
- Assure criteria protectiveness requirement with MLE
GOALS

Review Prioritization Exercise and Approve Priorities

Summarize one-to-one highlights

Begin list of discrete RFP projects
o Started with 13 ideas from 2019 that were not funded
o December – Two groups, modified Delphi ranking, introduced 6 new ideas
o January – Ranked all research ideas
o Straight average
o Are we okay with this ordering?
o Do we need to combine any?

<table>
<thead>
<tr>
<th>Research ideas</th>
<th>Mean Ranking - Feb 2020</th>
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</tr>
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<tbody>
<tr>
<td>1 How large is internal vs external loading (how long would recovery take?)</td>
<td>2.3</td>
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<td>2 Sediment budgets (C, N, and P; nutrient flux chambers)</td>
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<td>6 Lake level (effect on macrophytes)</td>
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<td>7 Bioassays that incorporate sediment (next phase mesocosms)</td>
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<td>8 Macrophyte recovery potential (Provo Bay demo)</td>
<td>10.0</td>
<td>10.7</td>
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<td>9 Lake-level effects on biogeochemistry and nutrient cycling</td>
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<td>10 Environmental controls on toxin production</td>
<td>11.1</td>
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<td>11 Turbidity effect on primary producers</td>
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<td>12 Resuspension rates from bioturbation</td>
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<td>17 Macrophyte role (to biogeochemistry)</td>
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<td>18 Additional atmospheric deposition data</td>
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<td>19 Alternative models (PCLake – cyano/macrophyte state change)</td>
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ONE-ONE CALL SUMMARY

- Last 2 weeks – met with everyone
- Identified some common (and unique) elements among calls
- We review those here
ONE-ONE CALL SUMMARY

- Items 1-4 are not independent
  - Does that mean 1 project?

- Internal vs External Loading/Sediment Budgets
  - Need to consolidate knowledge - may have all we need
  - Use intermediate model (PHREEQ, SEDFLUX) to consolidate and predict water column concentrations
  - What are internal load stocks and fluxes? Just sediments?
  - What critical stocks and fluxes can we put numbers on?
  - Can you use that to predict recovery?
  - More in-situ chamber measurements – run longer and more locations?
  - What is the mechanism of getting from sediment to water column?
  - Where are the major gaps/uncertainties?
  - How could that be answered?
  - Are sediments anoxic? Where? What is Redox condition? What is pH gradient?

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ONE-ONE CALL SUMMARY

- Calcite/Bioavailability Issue
  - What is P binding to in Utah Lake? May be more than Ca.
  - This chemistry is complex.
  - May be need for a pilot analysis/study to identify these.
  - What is the nature of binding? Mineral matrix or adsorption?
  - Sequential extractions may be needed?
  - Experiments to measure rate of P sequestration
  - May need lab experiments/analyses to get at the specific Ca formations
  - Focus on mixing zones at tributaries (low to high pH)

- Bioassay studies may have data on Ca effect (+N, pH)
- Algal growth potential assays could be run (easy to do)

- Need a WQ module to capture this.
ONE-ONE CALL SUMMARY

- **Model Modules**
  - Sediment diagenesis and Ca-scavenging need to be in model
  - Model like PHREEQ should predict how/when Ca-P is formed
  - WASP has sediment diagenesis module (2 layer – aerobic/anaerobic; does not do calcite or P binding chemistry – just equilibria)
  - WASP can model a Ca-bound fraction
  - What needs to be included to model calcite formation and P binding? All chemistry or just equilibria with pH?
ONE-ONE CALL SUMMARY

- **Nitrogen**
  - Is our understanding of nitrogen really lacking?
  - Estimates of N fixation? Nitrification? Denitrification?
  - Given aerobic conditions and low C in sediments, where is Denitrification occurring? Water column aggregates?
  - Is N building up in the system?

- **Lake Level as a Driver**
  - What is flux from littoral sediments as they dry and wet? Sinks or Sources?
  - What is the pattern of wetting and drying?

- **Carbon**
  - Where is the carbon going? Is Denitrification carbon limited?
  - Lots of productivity, but low carbon in sediments (are they light limited?); NEP~0
  - Reaeration estimates?
  - Do we know enough about C cycle? May need more metabolism measurements.
  - So where is respiration happening?
ONE-ONE CALL SUMMARY

- Mesocosms are an opportunity
  - Manipulate: nutrients (by species), pH, sediment, carp, macrophytes, lake level
  - Can use mesocosms to test hypotheses about P chemistry, N chemistry, fluxes, drivers
  - Can measure all aspects of biogeochemical flux as well (lots of birds with one stone)
  - What is the best design (y1) and then implement (y2)
  - How does/does not this interact with the Timpanogas plan?
  - May want to try in Provo Bay – less wind/wave

- Any others?
PROJECT IDEAS

So, what project(s) do we want to prioritize to answer these questions?

We have time here to brainstorm some ideas

Idea 1: Compile everything we have on stocks and rates; try and fit a model like SEDFLUX and see where the gaps are? Report status, major gaps and propose experiments to fill them.

Idea 2: N budget study – what are standing stocks, rates, and fluxes of N? Start with compiling what we know and then measure the gaps.

Idea 3: Calcite binding - what are rates and forms? Again, start with assembling what we know and small pilot to study calcite formation, characterization, etc.

Idea 4: Mesocosm experiments – things you would conduct if you had mesocosms to use? A miniature N and P budget study? pH manipulations?