

Meeting Notes
Tahoe Science Advisory Council

Thursday May 16, 2019
10:00 AM – 2:00 PM

Tahoe Center for Environmental Sciences, first floor Rm 119
291 Country Club Drive
Incline Village, NV 89451

Participants: Sudeep Chandra (UNR), Alan Heyvaert (DRI), Adam Watts (DRI), Geoff Schladow (UCD), Steve Sadro (UCD), John Melack (UCSB), Pat Manley (PSW), Joshua Wilson (PSW), Max Moritz (UCSB), Ramon Naranjo (USGS), Paul Work (USGS), My-linh Nguyen (NDEP), Alison Toy (UCD), Lizzie Williamson (CNR)

Agency member participants: Bob Larson (LWB), Ed Parvin (USGS), Jason Kuchniki (NDEP), Patrick Wright (CTC), Dan Segan (TRPA), Jack Landy (EPA)

Draft Agenda

1. Welcome, agenda review, introductions (Alan) 5 minutes
 - a. Scott's peer review document, haven't heard from in and short on time. Please re-review and send comments directly to Scott, please use tracked changes. (Alan). Geoff suggests sending it out to the entire council, to motivate non-participants. Volunteers to take first editing duties, Alan volunteers to do the first crack while on vacation, send tracked changes to the entire council and ask for someone to be a second review. Thought it was great the first time around, if there's no issue, just say so. (ACTION)
 - b. John said he worked with Scott on it and has been through it three times and won't review until the very end.
 - c. Document has not changed since last meeting.
2. Council Operations (Various) 25 minutes
 - a. Update on status of new TSAC program officer to replace Zach's position
 - i. Funding comes from CNR, works half-time for the conservancy managing nearshore project and half is program officer for TSAC. Two rounds of interviews on a short list of three, one dropped out, and Robert Larson is the new program officer. Position needs to be re-classified, new package will be offered, and he will accept, not sure what time to start.
 - ii. He has worked for the regulatory agency Lahontan Waterboard. Accustomed advocate for agency, looking for a change, for him to tell agencies what scientists need.
 - iii. TRPA and other wants... to form working group to meet with them and update on how things are going. Set up a subcommittee of our executives, rather than just meeting with the executives once a year.

- iv. Co-production, fancy word for managers and scientists working together. This is what we are after (Adam)
- v. Engages the executive committee a bit more and yes it is what we are trying to accomplish. (Alan)
- vi. Not an adversarial relationship. Part of the reason for TSAC to have an independent science voice, but agencies often see that as free consulting, but we are an independent voice working for co-production (Geoff)
- vii. Please feel free to provide any input to Bob, intent for developing science needs and the needs for that science to be communicated to agency without editing.
- viii. Sudeep has two questions
 - 1. When does Bob start?
 - 2. Is there a period when we can have an evaluation of the coordinator in the next year? Is there a process where we can provide feedback to Bob's employers?
- ix. Geoff anticipates a probationary period, not sure what will happen if that doesn't work out. Anticipate starting in June. Alan and I opted to not have him participate this first meeting.
- x. John with this half time of dedication, this type of arrangement has other types of issues. This needs to be addressed really carefully and decide how it's divided up and who is calling the shots.
- xi. Geoff says this was seen by Jim Lawrence and Joann Marchetta, which is why we have this external review coming, to manage time use. Other position will be through Patrick Wright at the CTC and we can be frank about dealing with issues that may present itself and finding a solution.
- xii. If Bob does not adapt and take the science perspective, this will be a probationary period and there will be an opportunity to provide feedback. We may need to think about a formal way to provide this feedback. He thinks he can make this transition and wants to. (Alan)
- xiii. There may only be one or two meetings before the end of the probationary period, may need to discuss with Patrick (Ramon)
- xiv. Adam thinks we should come up with some type of expectations for Bob.

b. Progress on existing TSAC projects

- i. Upper Truckee Decision Support Framework
 - 1. First meeting was held December 2017
 - 2. Developed a conceptual diagram of how things interact across a variety of human and natural factors, Ramon did some figures
 - 3. John put one figure into the draft Science to Action plan, so you can see what it looks like.
 - 4. Met and focused on Science to Action plan and decided to divide on a subset of the diagram. John to offer a perspective on greenhouse gases and carbon sequestration and its linkages to human actions in the basin. Alan was supposed to write about wetlands and aquatic systems. Geoff was going to write about water quality. Not clear how extensive this document will be.

5. That's the best we can say about this until we can provide templates (for where we're going) and products to the rest of the council. In the process of working on these with a narrative, discuss linkages of processes. Idea to identify areas appropriate for review in terms of decision support. (Alan)
6. Would like this to be deliverable for the Bi-State Executive Committee Meeting in August.
7. John points out that two big things were left out, Groundwater interaction, something we learned during training, would be great for Ramon to get involved with. The forest is also a big part that needs to be started pretty soon!
8. Alan says free to start working on those, but Geoff, Alan, and John will plan to write up theirs as templates.
9. Sudeep wants to know if we are talking about the UTR Decision Support Framework, has there been a document sent out? No.
10. Alan says there are critical pathways that need to be developed. Hoping Pat can develop something with forest.
11. Sudeep says to not forget UTR biological restoration
12. John referred to the S2A because there is a flow chart that went into the document.
13. Pat says in terms of up to date, wants to know if there's a documents or drafts to look at? Only what we have from that initial meeting in 2017.
14. Alan says what we need to do is what we are discussing. No example of a draft document, anything that might be produced could serve as a model to everyone. Have at it, but in the absence of that Geoff, Alan, and John will give it another crack.
15. Please recirculate those notes. Flow document would be useful.
16. John worked up a sketchy thing and can bounce it off a few council members, so hopefully we will have something to seen something soon. (ACTION)

c. TSAC work plan development

- i. Meet with Bi-State executive committee to discuss work plan. We need to develop again. This is something that usually Zach took an active part of developing. We will have to do some of the initial work ourselves.

d. Science to Action plan

- i. Phase 2 of decision support system, expecting Pat will take a lead in that. (Alan)
- ii. In the spirit of co-production, we have to be responsive to the objectives of the agencies (Geoff) Council members need to think about what is important and let Geoff and Alan know.
- iii. Ramon thinks we need to incorporate important points from the S2A plan.
- iv. Alan says that... there will be something related to the thresholds, for TSAC engagement. May have to do some of this offline. If there is

something that isn't represented in the workplan, let us know if you think the council should consider this as an important issue for us.

- v. Adam, met with senator masto in Washington, wants wildfire to be examined for the Tahoe basin. But things may change depending on presidential campaigns and wildfire season. Is this something to include in next year's activities?
- vi. Alan agrees fire management is important, Adam and Max have done presentations, it is worth looking at. Good example of things we are looking for. Geoff agrees, but the allocation of the elected official time is usurped by agencies, if we think it's important we need to insert this into the conversation. We need the science viewpoint to explain the topic to the agency member.
- vii. But to have something on the workplan would be appropriate says Alan.
- viii. Lizzie says that fire is something on the agenda. Not off the table to do a TSAC specific project. Just as we are evolving, Geoff requests that Lizzie start the conversation to have TSAC as some representation.
- ix. Josh sits on the prescribed working group, wondering what research avenue is most interested. Impacts of wildfire in the basin, smoke, etc.
- x. Adam sees water clarity as the most discussed issue, then the smoke effects on clarity, directly via deposition or indirectly on vegetation. Maybe comes back to is whether or not this is within the domain of TSAC.
- xi. Alan suggests appointing an ad hoc subcommittee to look at this and see what it takes to put together something for the work plan related to wildfire and areas important to look at.
- xii. Pat existential question is what's our identity as TSAC chooses what to take on. Likes Alan's suggestion and wants to help develop the forest debate, terrestrial ecosystem based science portion of plan. Models of forest growth from Tahoe West, management scenarios, smoke, and wildlife habitat for the entire basin for two different climate scenarios, 100 years, there is a lot to draw from there. Not sure how to package that, but it is a resource.
- xiii. Geoff says appendix 2 has models that exist for the Tahoe Basin, there is a terrestrial model, but it would be great to add something else and a few lines of what they do. Pat will take a look (ACTION)
- xiv. Sudeep supports the idea of a subcommittee formation. Last year the conversation with a different senator was detection. Keep in mind as we highlight these things, we may want to tap into the collective work of people outside of TSAC for how to manage system.
- xv. Lizzie from the agency side that New deputy secretary of forestry, Jessica Morse, thinks she would be happy help guide the work and to engage or participate with a subcommittee.
- xvi. John says Upper Truckee subproject already has fire as one of the top driver, will have to include.
- xvii. Ramon has question for Pat, Tahoe West project, is there something you are working with that can be expanded upon by TSAC.
- xviii. Pat, the plan is to identify work that needs to be done, no prescription, we as TSAC can incorporate in our work plan that we can facilitate or lead

areas where there are gaps. While there is a general Tahoe basin model, it's for larger applications. What do we need to do to better inform better mitigation or actions plans? We could further the modeling and focus on a broader array of resources, look at 8.5 level instead of the level 4. More robust studies.

- xix. Geoff wants to know if there's a document that Pat could send out for circulation. Vulnerability assessment and/or the Tahoe Basin production. There is a ppt available. Send to Alison and she will distribute to everyone.
- xx. Alan says it sounds like we have consensus approval for formation of subcommittee to address fire mgmt. in the Tahoe Basin. Who is interested? Probably Pat, Max, and Adam. Maybe Josh. Reach out institutionally outside of TSAC.
- xxi. Adam says he wants to see Max on the subcommittee.
- xxii. Pat says she will be chair of this subcommittee but wants a co-chair, this is just to kick it off. Adam says he is happy to help her.
- xxiii. Pat and Adam to put together this subcommittee and draft a few lines about plans. Will hear from them at next TSAC meeting (ACTION)
- xxiv. Subcommittee first meet and then establish communication with Jessica Morse.
- xxv. Alan will be adding extra requests for funding regular TSAC business in work plan. Don't forget to send the request for honorariums etc.
- e. Review and approval of Guidelines for Independent Peer Review (Scott, if time allows)

3. Council member review and discussion of TSAC

Science for Action 4/26/19 workshop materials

(Geoff/Alan) 90 minutes

- a. Phase 1 is done says Alan. The final document was distributed to the council yesterday, it is final and is being used to inform discussion for the 2nd phase. Discuss now and with agency members at noon.
- b. We have an hour to discuss now. But the rest of the meeting will be dedicated to discussing with agency members. (Geoff) One feedback from the full committee to the subcommittee. Not enough time to discuss this. But it had to be created at the request of the state. Now we have time for everyone's input. When we met in Davis a few weeks ago, the approach to be described by John, rather than carved out specific projects and costs of each, the people is missing who will analyze data this is being created. FTE how much do these people cost. Geoff added the tables of what the current monitoring is, spanning more than 5 years rather than projects. Help to identify what is needed, asked to undertake this, to let agencies know what to plan for, they need to engage more with models. That's why there's a list of models that everyone can add to.
- c. John says that more important than the people, the notion that we frame looking forward in the context, models are a template of knowns and unknowns. There's a lot of data out there that's not being fully used or examined, that's where

there's a people need. Trying to understand the Tahoe System we need modeling framework. The document we have, the model portion needs some fleshing out. Models lack in parameterization, what data is needed to improve models. Looking for a longer term vision project, step away from near term and look at larger questions. Make our thinking more rigorous in terms on the knowns and unknowns.

- d. Geoff says the end goal is not to get out another project, but to reset the conversation where there's something more on the order 1-2 million/year for a number year i.e. TMDL process where there was money assured and a scientific program, and dozens of people were involved with different aspects. Launch some process to fill data gaps, models that answer a range of questions that the agencies have or should be addressing.
- e. Sudeep didn't think the document as a modeling document. Appreciates a conceptual model that is a modification of Ramon's and then different subcomponents of actual models that will help guide understanding. Then identify gaps within models within. Wants to help structure the different biological components as it relates to restoration of taxa. On the biological side can be difficult to model because so little data but we can come up with conceptual model for restoring cutthroat trout. How does the biology feedback relate back to water quality? I like this research vision and it allows him to grasp connection to the bigger picture, good starting point.
- f. (Alan) With models developing context. Models being used for different purposes, pull them together and show the linkages to id gaps and develop tools needed to fill the gaps/show the linkages. That's what we want to sell to our agency representatives. We are looking at this as a system and identifying parts that are sensitive and we don't understand and tell agencies about what they can anticipate. This document is short and for general agency consumption. Explain clearly why we are developing this modeling context and why we are talking about these specific models.
- g. With the bio attributes at the Lake, very little data, but snapshot data showing decline in taxa, or increases in non-natives, but what role does this plays in clarity or recovery of native species. But this will allow me put things on paper to link to other aspects in the watershed. There different thresholds, fundamental EIP attributes, and one of them is recovery of native species. Where do we want to engage the management committee?
- h. Geoff, suggests you spend millions of dollars of cutthroat trout, will the shift in temp, stream flows, magnitude, and timing, will it accommodate for LCT? Is it throwing good money after bad?
- i. Sudeep says there is a separate subcommittee dealing with the climate adaptations in the basin. Target where the EIP fits in and suggests connections with thresholds and improvement system. What's helpful and not in the EIP?

- j. Pat says the initial s2a driven by secchi results and political community. Let's have the S2A document and plan really showcase the breadth of what TSAC can lead or facilitate. Climate adaptation, vulnerability assessment, EIP threshold update and TSAC has worked on three. What are the things really causing or the main sources of info that is driving our consideration for needed science? That's the input. The output is where can this info be applied to make a difference in the future? Lake, terrestrial ecosystem that we are trying to build in so we can answer those two questions. Bring together these drivers and have this vulnerability assessment that will go into action and we need action plan that responds to this and broaden to make this more relevant
- k. Alan in second paragraph really calls out climate change as dominating factor, tools at our disposal, and gaps. With climate change it impacts everything and connections between watershed and lake. Really focusing the role of climate change in terms of context will help us explain this to our agency partners. Keep in mind as we work with them today. Not sure how much we want to get into the details. Think about how we want to communicate with the agency members to explain our research vision and engage with them to begin to id priorities and recommendations.
- l. John's saying it's important to include Pat's and Sudeep's point. Where's the biology? How does it get added in? We got these questions from the state, if we approached in this way we would answer these questions. Make sure these threads are tracked.
- m. That's what these meeting notes will be for... tracking these threads.
- n. Regarding talking to agency partners, we really haven't discussed this ourselves. Short draft document needs to be vetted.
- o. Geoff thinks this discussion will happen with agency partners.
- p. Sudeep, Think about the process, as linkages to managers. Are we interested in the monitoring of the groundwater or the linkages to that groundwater... includes things like remote sensing, or is it more important to id change. ...Get us to understand key processes.
- q. Pat really thinks what Sudeep has said and others will make the document stronger. Can we come to a proposal? This document focused on clarity we will build in a biological component and other components. Upland and terrestrial ecosystems? If so, we can relay to managers and that we will be building on the lake clarity that are pressing and relevant. Make sure this document addresses these pieces that also id practical applications. Ecology and biology piece and terrestrial piece?
- r. Max thinks one of the goals that come out of this, key issue that comes out. ... this is one of the things that should be front and center.

- s. Ramon thinks to start with agency questions as a starting point. Maybe too tunnel vision, but by answering those questions or listing those as priorities, then adding the key science question would be a great way to start. Adam agrees and thinks we can take the agency views and come up with something more comprehensive.
- t. Geoff says to think beyond clarity. Would rather come up with the vision with measurements and models that has a broad set of goals, by doing these broader things, this is how we can answer those specific agency questions.
- u. Ramon says with the agency questions, there's no mention of fish, beyond staff concerns, fundamental fire and fish isn't listed in management questions.
- v. Those questions were related to the lake clarity monitoring results. (Pat) Where we are going this was precipitated by that concern, but now we are saying there are other sources, other points of concerns, and we want to address those too.
- w. Alan says we are focused on lake clarity and lake health, which encompasses on broader issues. Constraint is that we are still focused on lake, but this includes AIS and other biological conditions. Approach being proposed, an integrated set of tools that allows us to address what's happening in the lake, taking a systems approach and point out that within that we can answer the specific question
- x. Would we have a separate s2a framework for terrestrial? Essentially we have a system, it's the basin. We should treat it as a system. The s2a plan that doesn't include that will not be treating it as a system. Thinks that there should be a framework for a lake and clarity, but then there should be one that centers around terrestrial, development, etc. Cast our net as broad as the needs of the basin.
- y. Alan says we have to look back at the WO, which has us looking at Lake clarity and lake conditions. In terms of the broader picture, this ad hoc committee that looks at fire and terrestrial conditions will advise the WO which will then take on a broader system.
- z. Adam talks about this conceptual model that could be downsized to other smaller systems. Think it is very integrated, at this point, we can focus linkages on wildfire and biological factors that affect water clarity. Still be respectful of their effect on this issues. Develop something that is conceptual and includes other modules that speaks to a given any question that comes up.
- aa. Geoff says there will be forests models, groundwater models, fractured rock model, atmospheric deposition models in basin and out of basin, show how processes impact the water resource. Would draw the line on the social economic model as a smoke filled basin would have serious socio economic implications. Where are we or do we have a consensus?

- bb. John wants to hear everyone's ideas. Nice to know what people's thoughts are before we move forward.
- cc. Josh wants to know where we go from here. How do agency managers want to take this information on and turn it into application? Doesn't think there is anything in the document concerning or inappropriate in document.
- dd. John thinks this kind of document, doesn't focus on funding, designed to ask much broader questions about how lake ecosystems work with lake function. Let's not get caught up on funding at this stage. Tasked as Science Advisory Council, have not done a lot of science. Let's identify the main science questions. What don't we know? I think that's our primary goal.
- ee. Josh as framing for S2A this has to be apparent to land-scale mgmt. action.
- ff. John says as we are tasked as TSAC, best science that underpins our best understanding of the lake. Don't worry about the agencies before we id the main science questions. That's the primary goal imo.
- gg. Sudeep wants to develop within this framework, in the climate future, what type of native biology will persist in the lake and that agency members should be concerned with, which ones to exclude? Nearshore temp. and how they affect predating fish or how it restricts native fish. Streamflow changes in terms of timing and flowrates that might prevent LCT spawning. Also like to think about shifts in clarity and future clarity dynamics how they impact the 10 native species bottom dwelling species between 30-100m deep. Organisms according to EIP need to be managed. Last question, if we decline native bio, what happens if we recover native fish back to their historic numbers, perceived goal of mgmt. How do their nutrient excretions affect nearshore clarity, thinking this will negatively affect the water clarity goals.
- hh. Steve thinks a lot of what Pat and Sudeep speaks to how he feels. Need to look at this more holistically. Systems in watershed affects clarity, without including this won't get us anywhere. Try to id a conceptual way and a way to anticipate anthropogenic change scenario that affects lake health, this addresses future issues management may be faced with.
- ii. Pat, drive to use prescribed fire to bring up to more resistant conditions. But we don't understand the upper limit of this strategy, what the lake can handle. Risk of natural wildfire is a social limitation, letting burn is a ecological limitation, 10x prescribed burns I in the Tahoe now, what actions can we take that include the forest to provide all the benefits including water and water quality. We need to understand the domain and have the ability to answer this with funding. One year away we are pushing for basin-wide forest mgmt. strategy and we are missing critical info affecting forest and lake conditions.
- jj. Prescribed burning and transportation work is being done by Tahoe West.

kk. Alan reads from WO phase 2 sentences “Ultimate objective is to provide...” we must be cognizant of the limitations of funding and time. Processes in watershed and airshed are affecting water quality. We can id them, but ultimately for recommendations for this document, we id specific things to answer agency questions and then other things aren’t on the list. Will not be effective if we try and pull in everything. Make it responsive to agency immediate needs.

ll. Geoff thinks we should our list of our top issues and start clustering them into groups. It will be a long list.

mm. Alan thinks about looking at lake domains. AIS (native and invasive), specific categories of research that address those areas

4. Lunch Break (All) 20 minutes

5. Council prioritization and planning exercise with agency representatives on the Science for Action framework (Alan/Geoff) 90 minutes

a. June 3rd Bob will be new TSAC coordinator!

b. Phase 2 S2A planning recap for agency members from Alan, a tiered approach, near term, mid-term, long-term. Workshop in Davis a few weeks ago with 2/3 council participation.

i. Review what we have been doing in the basin and what we have learned

ii. Frame our approach in a systems orientated basis

iii. Looked at models currently under use for the knowledge value they bring in understanding how these systems function

iv. Need systems integrated approach to understanding lake function

v. Discussed working currently done in the basin and the important question in terms of agency mgmt. in the basin. Pairing this with the developed agency questions provided previously.

vi. Geoff adds that we are trying to get to a larger science framework that ids critical gaps in data and models. So questions can be addressed and determine potential future questions. Example question dealing with monitoring algal growth, in understanding the question what do we need to know about nutrients from streams, groundwater, etc. need a framework to apply to this type of question. Not a list of projects, but a broader dev. Of tools and data to address questions like this.

vii. Bob asks is there a product you are envisioning? What does this framework consist of? Geoff does not know, we are in the process of assembling the data we have and don’t have. Data that isn’t being analyzed, perhaps the person is the need. Build the science to be able to

answer proposed questions and future questions. But does not know what that framework is.

- viii. Alan says the goal is to have specific recommendations in addition to setting up the framework.
- ix. Within the next couple of months det. Monitoring need that are floating to the top. (Bob) Alan says it's not just monitoring but also model refinement, ... etc.
- x. John says we have this phase 1 product produced.
- xi. Alan says the phase 1 is a constrained view. This phase 2 in addition to near term recommendations also includes a framework where the recommendations will fit. Questions proposed by agencies will be answered in addition to questions...link models for science understanding on the lake and eventually for the entire watershed.
- xii. John says it will be useful to make a suggestion as to when we will have a draft document for distribution. Timeline needed!
- xiii. Alan says it's a conversation, will be at a TIE meeting on June 6th to present what we have in terms of this project. Would be great to have prelim. Data. In approx. 3 weeks would like to have a presentation that effectively communicates what we are doing and why. Done as a product prior to our executive committee meeting.
- xiv. Near complete document by the end of June beginning of July says Geoff. For the agency members are there critical dates.
- xv. Bob, thinks the critical dates were hit. Executives have interest in addressing things... seems early to bring forward the s2a product
- xvi. Patrick says important to realize the funding deadlines. Budget changes proposals are due soon, early June. We have some time, if out of this there's an effort to dedicate state funding to this effort then pay attention to state funding cycles. \$500k in gov's budget for the fiscal year starting in July. What's highest priority for that money? To what extent can we get on the same page regarding priorities for funding?
- xvii. Sudeep, TSAC needs time to reflect on this S2a concept. Can you keep things in budget categories or do you need specific?
- xviii. Budget concept proposals to be sent into CNR June 7 (Lizzie)
- xix. Bob says we need to start having specifics and are focused on the clarity question. What are top priorities with respect to that question? We need

both broad question and specific detailed prioritized aligned to state perspectives.

- xx. What Sudeep heard this morning is that with the s2a we have the opportunity to get more broad. In the coming months it will come together given the earlier conversations.
- xxi. Geoff still need prioritization for putting forward to the agency.
- xxii. Alan summarizes: existing funding start of the fiscal year, SNPLMA coming online, new TSAC Workplan to develop, and opportunity to consider concept for funding.
- xxiii. Is the council in a position to put together suggestions for the TIE steering committee? Yes, in the first phase 1 doc, some things that would really work i.e. ...
- xxiv. Not saying this is what we recommend, but hopefully we can identify today.
- xxv. Just a concept proposal if you get to the fall then greater detail. The \$500k, is available now. Bob says the council would do well to get money on the table now.
- xxvi. Concepts, just need a why.
- xxvii. Priority projects identified needs for first available funding, then makes for a good story that we can build on (Bob). Tell a big story about what we can do now and how to get to those resources and where we are planning to go?
- xxviii. Today, is mean to initiate that process. (Alan) Let's get some of these ideas on the board. Capture the agency and science perspective. This BCP, focused on clarity, id specific recs. For how to get that money.
- xxix. Jason, we need to better ground this within the agency needs. Needs are laid out via TMDL, look at clarity model and updating that. Fits well with proposal with climate change as major driver on horizon. This is a good place to start. Can the clarity model still predict clarity and how accurate is? Updates to model?
- xxx. Alan need for a comprehensive look and build framework around to incorporate that.
- xxxi. Jason says it seems first step would be to run model.
- xxxii. Geoff says we use model every once and while.
- xxxiii. Alan says, is it being run with calibrations and such.

- xxxiv. Bob we have a foundational knowledge, a review of data and available tools to see where we are and the gaps. Be explicit about what is being captured well by the model and what isn't. In order to improve, this is the info needed. The council has strength in numbers, how do we capture everything and what is missing.
- xxxv. This process has begun at the workshop. What is the info needed for the models and what are the gaps.
- xxxvi. Geoff says we could just run the model, but it requires an insertion of atmospheric data, it would be an assumption. At the time, there had been assumptions made about groundwater, maybe the available info has improved. Now we find Cyclotella and we need to take that into consideration.
- xxxvii. Jason, it could go a long way to try and include that and run the model.
- xxxviii. Alan says part of the exercise identify weak areas.
- xxxix. Ed says that's important. Bob says additionally sensitivity.
 - xl. Pat has another suggestions, if this falls within that \$500k or early concepts, model forest mgmt. activity including prescribed burns and mechanical treatment to reach confidence about impact to lake. Input variables that could be calibrated and come to an idea of the impacts. Run mgmt. scenarios to determine thresholds and see if the conflicting needs for managing water quality needs and forest health needs.
 - xli. Bob says it is obvious that vegetation should be considered. Talking about different loading impacts. Good questions. But we have a good idea of how loading affects clarity. But we want to know if there are other things like stratification, mixing, resistant to mixing, that affects clarity. The managers need to understand these variables better outside of loading.
 - xl.ii. Physics are changing, the ways inflows are changing, complex representation of the lake. (Geoff)
 - xl.iii. Patrick policy ideas, agencies are recommending leaning towards more thinning over burning, because of effects of clarity. Significance of tough questions that is all about prescribed burns. We will be challenged as to whether or not this finding is relevant.
 - xl. iv. If your answer is optimizing water clarity, it might not be convincing (Adam)
 - xl. v. Pat says we don't understand about the ability to use prescribed burns as a natural disturbance. Preventing catastrophic fires, has direct end to lake

clarity but we don't know what the upper end is. How much disturbance overall can we accomplish that still balances with maximize upper watershed to achieve forest health, sediment to nutrients in Lake Tahoe... Magnitudes 10x, 20x of disturbance is the objective to bring forests into resilience conditions. Sacrifices on either end that we are unsure of.

- xlvi. Patrick asks if the model is updated, is it focused on deep water clarity? Or lake conditions that takes the nearshore and the biology into consideration?
- xlvi. Bob says it sounds like we need a 3d model to understand water clarity. Magnitude of loading, how much loading can the lake withstand, then Tahoe West determines the prescription amount of mechanical and fire that is within the threshold of loading. So it's a matter of how much loading?
- xlvi. How focused are we on mid-lake clarity? How much of the nearshore are we concerned about? There is a monitoring framework already developed for the nearshore. Bringing too much in complicates the discussion. Not trying to discount nearshore, but...
- xlvi. Alan says Brad Crowley had proposed, is there something else we should be looking at?
 - i. Bob says it seems like we keep coming back to clarity. Given long term data set and the understanding of the variable. Focus seems on midlake clarity.
 - ii. Alan says it might be a focus we might want to adopt, but there are definitely other viewpoints. If there's a bad algae year we could be considered negligent.
 - iii. Another topic to take on (Bob), periphyton has been under intensive modeling and research, update clarity model to include periphyton, does it stretch out too much.
 - liii. Geoff, says with the 3d approach we can address both clarity and periphyton then it's useful.
 - liv. Jason taking into timing coming up quickly. Need to focus. Nearshore might be a component, how do you build the systems approach.
 - lv. Alan, it will be in what we develop ultimately, at this first level, it may not rise to the surface.
 - lvi. Patrick says think about options, it's smarter, we hear you here's are plan, rather than say no.

- lvii. Jason recalls a question is this the new normal for the Tahoe basin? The new paradigm? This will definitely address climate change, what does the future look like, how do we offset impacts? This is a huge question that we don't know much about.
- lviii. Geoff says, climate change is the new norm. Within limited resources which are less uncertain to look at. Change land use. Forest treatment will start affecting groundwater, but it's not instantaneous. What we are getting at, there is monitoring that needs to be done. Look at changes to groundwater, you start it now and hope you have a baseline in 5 years.
- lix. Ramon says there were a lot of recommendations in the phase 1 doc that talks about climate affected changes to clarity, mixing, stratifications... There is a need for something tangible now to address gap. Given that info, what is the data need now?
- lx. Conditions can be used to predict where we are now. Gives idea to this annual workshop to develop a statistical model supplemental to the clarity model that allows us to fine tune understanding of system and system response.
- lxi. Pat, other idea of what we have control over, looking at forest structure on snowmelt rates and timing. ...Height and density effects. Good relationship between forest structure with snow retention, changes in upland conditions mitigating impacts on lake as a result of climate change. Speaking to the upcoming funding opportunities.
- lxii. Geoff says to add this information to the appendix document.
- lxiii. Jack says there has been modeling about the fuels efforts after TMDL was finalized and wondering if Pat is aware of that study. Don't know the extent of examining prescribed burning, might be needed in the future. Supports Bob's suggestion and looking at loading and seeing the sensitivity in recent years given the new ecological factors. Running lake clarity model as is and making assumptions of things we don't know and see how badly it performs, would be first step.
- lxiv. A Sensitivity... Geoff
- lxv. Is the model useful for scenario. Prescribed burning and clarity goal conflicts, future predictions, Zero prescribed burning might be compatible with clarity goals, can this be tested?
- lxvi. Might even be compared with out of the basin wildfires affects compared with the effects of prescribed within basin? Then is it worth prescribed burning? Adam

- lxvii. Ramon, missing discussion climate change smoke into the. Looking at adding factors onto a vertical profile, atmos. Loads need to be downscaled to a stress, is the model as it stands an appropriate tool to get into changes of forest mgmt. or fire? Need to change these factors into a source tool.
- lxviii. A2 and b1 scenarios, based on the climate scenarios did to the hydrology and water and air temp. But assumes same atmos deposition, does not account for wildfire, land use change, etc.
- lix. Bob there are climate change variable that will affect loading. You can change loading, question is whether these internal physics are being reflected. Then revisit other loading questions. Is our understanding of our system still valid?
- lxx. 50 years of observed clarity. Diverging trends of the winter and summer trends. What's happening in the last 20 years that caused that divergence? Dan
- lxxi. Alan says it has been addressed. Updating clarity model, also looks at the comparison of winter and summer. If we take clarity model as is, how practical and useful is it for sensitivity analysis for things like summer v. clarity? Change in the size of algae and stratification is the hypothesis. Do not have evidence, but wants to know if the model can test this hypothesis?
- lxxii. Geoff says the model needs to be updated. We have all this data we know it's happening who has the resources to look at it. It's happening slowly. Clarity was 11 meters, 6th lowest clarity reading, a couple weeks ago. The 5 last time it happened was 1983, literally same conditions we have now.
- lxxiii. Bob says put that into a proposal, don't have anyone reviewing all the available data. This is a starting point. Alan says it is part of our recommendations. Wants evaluation separated from workshop, seems like a starting place, communicate this.
- lxxiv. Data analysis happens, culminating in an annual workshop. Once we start there we can build on it.
- lxxv. Looks like its going to be an el nino, we expect A, B, C to happen.
- lxxvi. Anything we missed?
 - 1. Thinks we need to add something about what Sudeep mentioned earlier. Biology missing, understand response native and invasive species to climate change. Sudeep can elaborate later.

2. Alan suggests adding the impacts of climate change on stormwater and stormwater management.
 3. Bob says this goes back to climate change impacts loading. Loading in and clarity out, has that changed? Dealing with winter quality versus summer quality. Updating the meteorological model that is part of it. What is missing?
 4. Jason says to incorporate this into the planning process.
 5. Idea going forward take notes and list for distribution, if anything is missing, feel free to add. Create a structure to show what we have i.e. monitoring, tools, etc. and what is missing? ID priorities for BCP that are coming up shortly.
 6. Need to start coming up with a priority narrative which will be working with agency reps collectively.
 7. Bob says need to circle back to whether or not it is prepared for TIE. Alan says just talk about priorities and see if it resonates. Geoff says give update, but prelim priorities without input from the entire council. Alan says maybe examples instead.
6. Wrap up, next meeting date/time and agenda items (Alan) 10 minutes