

## Meeting Notes

Tahoe Science Advisory Council

Thursday July 18, 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), Pat Manley (PSW), Ramon Naranjo (USGS), Paul Work (USGS), Jason Kuchnicki (NDEP), Elizabeth Williamson (CNRA), Robert Larsen (CNRA), Alison Toy (UCD)

Agency participants: Jim Lawrence (DCNR), Dan Segan (TRPA), Jack Landy (EPA), Laura Korman (Water Resources), Ben Letton (Water Resources)

### Draft Agenda

1. Welcome, agenda review, introductions
2. Council Operations
  - a. Changes in Council membership: Scott Tyler stepping down, new replacement recommended to be Adrian Harpold.
  - b. Review the work plan development process (Alan)
    - Recommendation made by a state rep, agency, NGO, council member or executive.
    - Co-chairs and program officer review and determine if it fits with TSAC business, then prepare something for the full TSAC to consider.
    - Determine best approach, identify what team members interested in participation and identify a lead.
    - Lead works with co-chairs, program officer usually with the person who requested the project, help create a work order.
    - Budgets developed, individual work orders go to each of the institutions.
    - The program officer, submit complete package to Cal resources for funding approval. Once NV apply resources, it may go to them as well.
    - TRPA will send out work order for approval.
    - PI or subcommittee leads project and develop work products which are posted to the TSAC website.
    - There might be a few adjustments in the future, but this is currently where we are at.
    - Bob says there are additional resources coming in to TSAC has been relatively modest, in the coming fiscal year more projects and additional resources. Working to charter a regional manager team, writing that up now, and will eventually loop this group into the conversation to create a better relationship with agency members. Great opportunity to refine the process. Look forward to stream lining the process with these smaller funded projects.

- If Lake Tahoe Restoration Act happens, then additional SNPLMA funds could go through. Put best face forward to provide a consistent coherent message about what science is doing and what it can do going forward.
- c. Planning for Bi-State Executive Committee meeting
- Robert says held day before Summit so this meeting is scheduled for the afternoon on the 19<sup>th</sup>
  - Need a conversation to decide length of time
  - Highlight accomplishments for the last year, TSAC support for threshold updates and progress there, adopting and implementing a new threshold structure is a significant move. Looking at the work plan approved at last executive meeting: set up contract for council operations, looking at money coming in, and looking at clarity, terrestrial impacts, and SNPLMA funding. Plus \$175k coming in. Three pots of money to look at coming in. Bringing in clear tasks and getting their buy-in. Drafting an agenda now.
  - Council members invited to attend. (Alan)
- d. Review and discuss work products from FY19
- Discuss progress with TRPA and the threshold structure. (Robert)
  - Alan agrees, the work developing data structuring process that the TRPA is adopting, also some work finished up in terms of the technical cleanup for the existing thresholds. Most recently it is the Science to Action (S2A) product, hoping to have this as a deliverable at this meeting in August.
  - (Alan) Next year projected deliverables to be discussed today: sustainable recreation working group part of TIE steering committee, they have been providing with information to draft work orders. Spoken to Council members and identify colleagues who can contribute. Looking for expertise: survey design and methodology, user perception and behavior, recreational access, and identification and perhaps some high level assessment of resource condition at hot spots. Working on contracting mechanism first, then send out draft of work order for review, individuals identified from your organization that could contribute, then feedback before executing work order.
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- e. Review available TSAC funding through FY20
- Other things on agenda for FY 2020, California BCP allocating funding for lake clarity. Residual SNPLMA funds to look at land-scale effects on Lake.
  - 150k allocated annually in place at this time, will reduce to 100k. Always intended for council operations. Would be great to use these funds for work. It will have to be a future conversation. Continue to use these funds for this purpose although they have been underutilized. (Robert) Eager to get as much council engagements with this work as possible or is there more opportunity within your institution. Everyone is busy, the idea of adding to full plates may not be feasible, so identify priorities and determine who is available. Look at these pots of monies, what are the priorities and is there an agreement on this being a priority.

- Under-utilized funding, dollars are providing some value, driven by larger investments
- Hear a lot of funding coming in, council members are busy, adding to full plates with other projects look at feasibility, identify appropriate members is the challenge moving forward. What are the priorities, moving forward, who's interested and engaged, etc. Practicalities of needs, engage with Waterboard
- Looking forward, may continue to do so with available resources, substantive threshold work will need to look for further, after discussion with TSAC
- Thought 150K went through operations as well as the threshold work. (Alan)
- Robert isn't sure that was the case, but there wasn't an expectation of that 150k to cover a program operations and do work, but kudos for being able to do so.
- Looking at having 100k available with operation, where the funding comes from for actual work. BCP landscape scale, those things came about from the work from the co-chairs and nothing identified beyond that. Are we going to think about that?
- Geoff: Two pots of funding we have, will support two years of active science work, can't sit around and worry about what's next, it will take time to get these streams up and running, but not the day to worry about that. Bob counters demonstrating success value and good use of funds, because it is difficult to ask for more funds when there is 1.5 million of funds waiting on the table. Showing a good use of those funds and demonstrating use of funds for the use, that's the start of the conversation asking for more funds.
- Jim updates about what can we get in terms of NV support? Working on updates using the SB630 model, to have buoy leases to pay for operations. Currently for fees for buoys (\$30) and pier (\$50), not nearly enough on the Nevada side to raise the appropriate funds, trying to get that updated to (\$750 for pier), it's being heard in front of the NV legislature, optimistic Aug 21 more funding for TSAC support, discussion for how to contribute immediately, NV needs strong justification with specific numbers (hours, dollar amounts, etc.), another good reason for this steering committee for lack of a better word, timing is everything for budgeting, NV on 2-year cycle so if you miss, Jim is optimistic and excited.
- Robert says the same funding challenges happening in the state of CA.
- Geoff we have been working on the idea that we need to get the concept of what we are doing rather than economic justification, now we are in that second stage.

f. Updates from ad hoc subcommittees (FHWF)

- Scott Tyler set-up the peer-review subcommittee did not see a lot of action this year. Process is set-up and waiting for product to work on.
- Other group with Pat Manly in the process of setting up, forest health working group.
- Pat updates, we talked about this at the last meeting, busy time of year, it was unclear as to what this looks like, more discussion would be helpful, in terms of whether it's a lake and forest subgroup, how do we want to create some parallel structure in our and what are we looking for. What are the expectations? It would be wonderful to have parallel structure in our council these are three primary topic areas and here is how we are organized to do so, those are a function of a subset of our membership. Is our goal to come up with a composite set of S2A plans, are we broadening the S2A plan that currently exists? Some more discussion of how we are structured, and see that these

topically orientate groups pointed in the right direction, it is a good idea like these topically orientated subgroups.

- Alan said there was a bit of urgency because of opportunity to work with Lizzie Williamson, to look at BCPs, but short fuse, really not enough time to do that. Discussing our overall needs for basin, it is evident forest health and wildfire that are two critical issues that we need to address as a science council. Moving forward if we aren't actively working in those areas we will be seen as remiss, set-up ad-hoc committee (similar to Lake Clarity subcommittee), small core group of people to look at important questions and how to link with S2A planning, bring these thoughts to the council, now there is time to do this. This will set-up up for another BCP and as we finish S2A planning will be well-staged for integration between forest health and wildfire. Forgot who was identified.
- Adam thinks that it useful to ID members and their science key words, so it is easy to reach out for quick opinion. Another value if we have these groups waiting in the wing, i.e. fire group, forest group, etc. Representing different varieties of disciplines could easily call on these groups rather than wait for the next meeting for them to form.
- Geoff, asking the group what TSAC could do, tell us what is needed and what would be useful, what problems need addressing, and someone has to start.
- Pat, more in terms of function not content. If we have a forest/terrestrial subgroups then do we have parallel subgroups? With water or fire? If it's a point of contact, no problem. Develop research need and we will have parallels with various topic areas, S2A plan for the lake, then great! When do we want drafts of that? Filling this out in an organized, strategic manner, if it's a short-term need, how do we tap into that. What is the function of subgroup and the near-term need is, a lot of conversation is with interaction of external participants, which is when funding opportunities come up.
- Bob says this is good discussion, for value and need for these group. Immediate need for group with SNPLMA funding, clear need is for coordination with Lake Tahoe West science effort. 1-2 mil dollars on the west shore modeling, ground water, etc. huge body of knowledge and resources available. How this project or similar action impacts the lake conditions. Effort needs to be linked to the broader Lake Tahoe West effort. How are these funds being allocated to work being done. Good opportunity to identify priority tasks are with concern that overlapping coordination. Looking for science coordination across the basin. Engage with Geoff and the water quality folks to find gaps and what the opportunities are for working together moving forward.
- Alan we put Lake Tahoe West in there because we wanted to make leverage on existing work, landscape-scale effects on lake. Framework or draft for what we thought needed to be done. This conversation addresses that, what do we have, what do we know, what are the gaps, how to use the funding to address these gaps?
- Pat one more thing, in the form and function category, thinks that there is science coordination going on in the basin, outside of the basin as well, how can the council be a contributor to that. How can we be as effective, in terms of being value with the coordination already happening, working in coordination of the previous science council, lots of cohesion and coordination happening. I can bring some of this to conversation anytime, but what are we asking of these subgroups? Fair bit of state funding for upland and aquatic funding (prop 68), is that what we are organizing our subs around? Pull

teams that have expertise inside and outside of the council, make us competitive to bring funds to the basin. Wildlife conservation board had a pre-proposal that had no dollar limit, you can request for up to 5 million dollars, that is one of the functions we should be playing and do it in a coordinated way. One of the functions we could be playing bringing really competitive proposals together and in a coordinated effort and convening scientists. How are we portraying our value added in addition to the work being done?

- Alan says hit the nail on the head in terms of what we're asking, identify funding opportunities, then lets orchestrate an effort to go after opportunities that meet our needs. Would like to schedule for our next meeting, in Sept, a presentation about what is going on with Tahoe West, bring council up to date about the science that has been done and opportunities the subcommittee sees as ripe for council engagement.

(ACTION)

- Jason says to make it more explicit, if there is a research plan he hopes the conversation involves agency input. Applied science that incorporates agency management. If there's a plan, there would be a benefit to involve agencies to see what's on their minds.
- Geoff says that this is a 2-way street, agencies have a clear idea of what the need is, but science may have a difference of opinion, this TSAC has a platform not to dictate but to make agencies to think about longer-term larger science questions in the long-term that we would like to have extended discussions with various agencies. We all have particular tasks, careers, and job descriptions and somewhere in the middle science can be put to good use and the agency missions can advance.
- Bob the balance, when funding brought for a question, then there's less interest in funding for broader science question, need to make sure that both sides are heard.
- Jason say we need to remember that agencies implement these programs, we want to be part of the conversation, and a lot of times this is what is missed, we just need to be educated to have the understanding.
- Geoff says everybody was doing everything based on the best information and then 2017 there was a collective turn to science to say what went wrong, why couldn't you tell us? We would appreciate part of the earlier planning, it's hard when a finger is pointed at science after an event, what should we be doing, it's in a way we have a different perspective on your issues and we want to be able to address future questions.

g. Review existing or upcoming Council work orders

- Alan says in addition to S2ATRPA work order, data structuring approach to apply in a pilot sense to their threshold update. Continuation of that work to demo how it works in terms of water quality threshold standards that currently exist. Dan has drafted a work order, we will send out, please let us know if you're interested in participating in.

3. Council member review and discussion of the TSAC Science for Action Executive Summary, Research

- Joint product sent out from Geoff, Alan, and Bob. An advance draft, open for input and discussion. Geoff asks for specific input and questions.
- Alan provides context: Executive summary to a much larger document. Met back in April developed the vision of how we should proceed in terms of lake clarity and condition,

using models to inform our understanding of the science and communicate that science to the agencies. There is a vision document this is the front end document easily accessible to the general public, also going to be followed by specific work orders, work with agencies to identify the work orders that come out of these priorities to be, to identify individuals or teams that will work on to develop those work orders, and put together the budgets things like that. Same as work orders of the past, usually 2 pages, intro, sets the stage: Why this is important? What's the need? What are the questions being answered? What's the tasks, time line, budget? Who is doing what? Identify those work orders and develop those in advance of executive meeting. Key management questions that also went out, it is important in developing out work orders that we identify specific questions that the work order was designed to answer. 3 high-priority key management questions/items identified.

- Bob, what is the longer term vision? Would be nice to know the timing and plan. Knowing the available resources are dwindling.
- Geoff says the larger vision doc is maybe 85% complete, names are in bold in margin of people who still need to add to it. Gets to important point, what it says the science council doesn't think there are just a few series projects to be done, with climate there's a body of research that needs to be done over the long-term. As that is being done, hypothesis being explored, tools being development. Real danger in just answering the question presently, guessing at the future questions. Vision doc says what the 10-year vision is long-term, this exec summary looks at the short-term what will be done in achieving that larger vision in the next 2-3 years.
- Adam like what the climate change focuses on, but worries about other factors not being included. Do we specifically not include recreation other things, because they are anticipated as future projects or do we incorporate them now.
- Alan says wildfire is not included, why in part we want a wildfire forest health subcommittee to look how we can incorporate in the future.
- Geoff says some things might fall out of these executive summary as it's not immediate. Effects of people escaping to heat. Climate is driver for all aspects and management.
- Alan says he is worried to say that everything is the cause of climate change and it is a risk.
- Pat, appreciates all the effort put into these documents, when the April meeting happened it was really about the lake, the whole reason why this S2A has been driven to where it is, is driven by lake clarity change, so it's as much political as it is science strategy investment. If we have S2A brief, it should talk about the basin as a system. Here's what we recognize and many uncertainties surrounding that. This really is a system and address questions in a coordinated way, can make this more system-orientated from the get-go. If we don't address it early on, we end up looking at everything through the Tahoe lens. Address this in a coordinated way, if it's through the Tahoe lens, then it's not a whole system. Make this more system-orientated from the get go. 1<sup>st</sup> incremental year of funding goes to these broad questions, maybe that's by design, but let's be more explicit if this is a partial plan, call it out. We intend to develop a fully plan, but this narrowly addresses key questions about lake clarity but we will build it out. If we don't do this here, then our S2A plan is just about Lake Tahoe and that's our full intention.

- Alan, yes we should add something initially that speaks to the basin as a system. When we started this process a year ago we asked if we had too look at the entire basin holistically or do we focus only on lake clarity? Eventually it was expanded out to lake clarity and health. There was a conscious decision to have a more narrow focus, and eventually we will go to a larger scope on the lake. But for what we are doing now we are focused on Lake Tahoe over the next few years. Point is well taken, but we are specific on focused, and we are working on integrated.
- Adam, says to make this point explicit in the S2A plan, there are limitations, that this is an interdisciplinary group and can use this document to indicate the breadth of expertise and abilities beyond this area and provide something of value here and go beyond that in the future.
- Pat says timing is important, would be important to be aware of where the funding is going. Let's say uplands system, what's the intention there for bringing up to speed these other, contributions to the basin and where might those funds come from. The implicit assumptions that I'd jump to is that we won't even address those for a few years, while it may not be our intention, but it is what is communicated by the way we are phrasing it and it will make us seem like we are missing the boat. Barreling along in terms of forest restoration, how can we appear responsive to issues and communicate to the folks who spend 90% of their time on that issue, it's important that everyone is aware of and communicate our intention.
- Jim hears two different things, Adam brought up S2A plan should it be focused on climate change related or recreation or current development plans, should it be about the lake or the whole system. Focused on the lake and clarity and a little more on the lake system, which thinks is fine for the short-term. It needs to be very clear of what the S2A plan does and doesn't do. It would be in the best interest not just about climate, lake has been under pressure for many years, doing work today under existing condition and pressures and don't lose sight of that, not narrowly couch it in terms of climate otherwise you could lose supporters, because they might see that as down the road and they also address immediate needs. Doesn't know the timing, but ideally a draft for Jim, Brad, Lizzie, to see and digest in advance as opposed to at the meeting (ACTION)
- Alan, in our initial S2A did not focus strictly on climate change, TMDL in existence is made to handle a lot of other things, and there's a perception that it functions well. But if climate changes things then it changes TMDL. It is climate change that is going to be the big impact, whether or not we have to stress it, probably not, we can modulate the message so there is more than just climate, but this is the challenge of our time, but it impacts all of our fields and areas of the environment that we are talking about. In terms of the broader scope, we want to say something about how we think of this as a system. In our previous doc we were asked to look at the lake and we will bring that up again in the meeting. We do want to say something about how we are thinking about this as a system, but we were asked to focus on the lake. We have been working on this for a year and sometimes we forget how we got there.
- Bob, there's a middle ground here, climate has changed, it's not a future thing, it's a matter of what has changed, how is the lake is functioning based on the change that we have seen. That comes across to a degree, agencies need to be more responsive to the changes happening now which creates a sense of immediacy. We know with TMDL

provides us with good foundation and understanding but it is clear that things have changed to a degree, summer v. winter really highlights that. Focus on that trend difference walks the line, climate is changing and what it looks like now and then the future questions. I see in the document a broad focus of how we need to evaluate the lake and what science needs to address things moving forward 10 years from now AND we have money and what we are going to do. These two things clash so we may look at separating them because they are not easy to combine. The executive summary, S2A is here, broad focus. Separate companion document that outlines the funding and the projects, think big with document, draw lines that connecting the future projects and future funding sources. Meeting the need for the specificity for the resources that are going to spent.

- Which is the purpose of the work order (Alan)
- Sudeep, I would not separate document, we have come this far, add procedurally that this is a living document that is meant to be moving from year to year. Put broader context like what pat said. Put recorded videos in, it's a living framework, also have these conversations as a sign of our struggles of coming into priorities. So we don't have to go through this process over and over and keep these recordings as addendums so they can know what we were agonizing over.
- Jason said a part of initial charge letter, was that, are there other things we should look at other than lake clarity? That might be a way to bridge the gap of the system as a whole. Choosing to focus on lake clarity in the beginning but there is this larger charge we are intending to answer. We are experiencing climate change and that goes for a lot of things like population or over tourism is a huge issue right now as well, that could be included in document.
- Ramon, overall objective S2A was very clear to address concerns, not a lot of progress since document was created months ago. We tend to go and rehash, not sure if there's a better way to understand where we are at, perhaps share document with others, we have already discussed the purpose and we have had discussion about content and intent if it needs to be refined to core things of what we are going to do with this funding.
- Go back to the document and you can see what we recognized.
- Ramon doesn't think recordings aren't necessary because of notes. Follow-up more on action items because we seem to have same discussion over and over. Things have been happening around the lake since early Goldman work, things are changing, it's not just about climate, climate is only amplifying changes, and putting it in that context creates that sense of urgency.
- Steve, tying in this theme of how climate is affecting the lake and framing in a system like perspective. Most of climate's impacts are addressed by a catchment scale perspective. As scientists we understand this inherently, when we talk about climate impacts on the lake, we assume a set of nested impacts, and importantly these interactions between climate and other factors. We need to make sure that this is implicit in this document. Not sure if all the understanding is the same with policy makers or managers. Making that point clearly is nice conceptually, about the importance of a system holistically. We don't often know what all these interactions are, this will necessitate a system wide, lake-wide monitoring program in the longer-term.



- Paul thinks we need a really compelling executive summary because many people will only read that. Some of the things presented as management questions actually seem like science questions, with changes to verbage you can make them management questions. Make sure they are clearly management questions.
- Alan is hoping we can bring those front and center in work order that will be attached to this. Immediately after the exec meeting we will have work orders for each specific task, which is where we can id specific management question addressed by the task.
- Work orders will need to be prioritized and only used for the available funding. The other work is more of the vision part of the document.
- Pat the title, can we call it a S2A brief for lake clarity, that simple question addition to say that this is one facet out the gate and there are others on the way. In this list of over the next few years, don't see anything about Tahoe West mentioned, if fire and forest management will be added, then seems like we need to state that, add interaction between nearshore, and don't see that in the 5 bullets, calling them out more explicitly would be wise. Long-term science framework, we are also developing a long-term framework for clarity or is this a framework that will also communicate the near-term and long-term. Retitling might be necessary.
- Geoff says what has been tasked to us has to do with the clarity, another project dealing with climate adaptations project how climate will affect ais, forests, etc. what are these going to do for native species, what's the nearshore temp going to be? What we are trying to set up are these tools in place to answer the immediate clarity questions but then also set us up to answer questions related to ais, native species, etc. If we put clarity in the title we would lose  $\frac{3}{4}$  of the people invested in the process, clarity is part of it but it's just one of the outcomes.
- Pat says what the intention is? S2A around climate change, thinks it's a great idea, do we have a s2a plan around forest, fire, upland or freshwater ecosystems and ecology outside of Lake Tahoe? We no longer have a really up to date research plan. Making things up as to how we might partition this. Don't attach to this lens, say yes, we have one lens we have multiple lens, and yes they are connected, we would have a climate change lens it might look really different, a s2a plan might look really different who are the core and inner actors based on that alone. This is a call of what's coming up next. In the next plan there will be a bunch of research needs, tool needs, and we need to be ready to address that supports this climate adaptation plan. Like a series of perspectives of addressing these tangible issues. Contrary to how it's currently cast, by working in the sectors not related to clarity will resonate with a suite of people.
- Alan agrees yes we want to set-up a larger framework. But must be cognizant of deadline to have document produced before Executive committee meeting, what we are doing provide rationale, id team, and some rough funding estimate in the next three weeks.
- Bob agrees, what is needed by the 19<sup>th</sup> of August. Setting aside broad vision or system discussion, what is needed is a clear discussion of how resources will be spent or allocated moving forward. We keep having the same discussion, because there isn't an agreement as what this document looks like, and there isn't a line for agency members as to where we move. What are we looking at more broadly, what the integrated plan looks like for science in the future whether its S2A for terrestrial system vs. the lake or

other things. What are the available resources going to now, there needs to be a link and touchstone back to broader vision, how we will spend this money well.

- Adam, feels like we heard the beginnings of effective ways to spend money. Take these good ideas that would improve documents and have those as activities under S2A plan. Can expand this by making these as subtasks and develop those and listen more to stakeholder and agency members.
- Alan says add a task that does that, continues to work on this integrated vision that brings in this terrestrial aspect that works with agency partners. As Sudeep pointed out this is a living document and we are not just planning for next year, this is setting the stage for how we plan for the next 10-20 years, certainly for the next 5 years. WE actually identified in last meeting, several priorities, in our original executive summary but we took them out of this version because those are represented by work orders. Executive summary first, adding a work orders after that describing what is going to be done, who is doing it, the deliverables, and the cost associated with it. I'm not drafting all these work orders we are going to identify a point person for each of these.
- Bob says the tasks descriptions will bring a broader conversation. Talks about the pots of money 500k and 400k independently, also lend some support that within these pots have task order that describes state of info and state of knowledge, plan for moving forward, the gaps and needs moving forward.
- Alan goes over 5 points to not have conflicts amongst ourselves once we start working with our agency partners. In these summary notes from the last meeting under item O, where we had previously worked up on the white board and compiled priorities and then collapsed a few of them and created this subset of 5 things to encapsulate the things relevant for the lake and s2a plan we are developing now. Some sort of work order for each of these tasks, whether or not it is these 5 is debatable, it does not to be these 5. For example the 3D lake clarity model, there has been some discussion as to why we need another model? Don't we already have one? Do we call this it in our executive summary? Or is it a lake process model? The task order will reveal it's a 3D model, should be clarity in task order and the rationale/justification, don't need to call it out as a 3D model in executive summary. With Ward creek, lots done with Lake Tahoe West has already been done, maybe some of the things we are thinking of has already been done, there will be some discussion there. Do we need to reword it in the executive summary?
- Bob says that a lot of people will read and think it's not what expected. What this is and what this isn't be explicit, how resources will be spent, how justification will be mapped out, and explain that it is coming.

#### 4. Lunch Break

#### 5. Council discussion of FY20 TSAC work plan and Science to Action projects with agency representatives, recommendations for Bi-State ExComm meeting and the Tahoe Summit

- Alan: 1<sup>st</sup> review key management questions.
- Review notes from last meeting where we identified the priority tasks we saw as relevant to s2a, then look at the 6 bullets that we are planning to write task orders for.

- Geoff: First cluster of questions regarding clarity, is one of the priorities is addressing the trends between winter and summer clarity. Review management question, id relevant tasks, then look at 5-6 bullets for what we are riding task orders for. These tasks should address questions. Just to refresh everyone about what was a key question for the agency as we are looking at what we are doing.
- Alan: Are these relevant to our particular S2A? \$900k to answer questions, do all these questions have to be answered with this funding or are there priorities here? Divergence of summer/winter clarity is a priority as identified in our s2a doc.
- Geoff: Most science is not done by this group but is addressed by other group. Development of model or looking at particular models SB630 funds covering now. How has ecological aspects changed in terms of clarity. Comprehensive model needed that goes beyond clarity. Looking at ecological and physical change.
- Alan: Whne agency reps asked how has ecological change affected clarity,m what do you have in mind?
- Geoff: Two aspects: emergence of small diatom that has had a tremendous effect on clarity we can track numbers and clarity going down, it has been in lake forever, physical factors driven by climate change make this particular organism more prevalent. Climate change impact on clarity and ecology. Part of the reason we believe we have historically high clarity is because higher trophic levels help maintain that, so more work being done on Mysis shrimp, and if it's introduction is a factor on clarity going down, native zooplankton would have had the capacity to eat Cyclotella and other diatoms. Ecology is not just about nutrients it is about other parts of the entire system. Not simple questions, can't just model nutrient input, etc.
- Jason: This leads to questions about Crayfish and nutrient cycling and nutrient concentration. All maybe related to the nearshore.
- Geoff: Does climate make the environment more/less hospitable to crayfish? The third one, is clarity model still capable at predicting deep water clarity, if not, what data is needed? No, because the physics of the lake have changed, no longer 1-dimensional system, now 3-dimension. When nutrients and fine particles come in are increasingly ceing controlled by climate driven processes. As time goes by you are increasingly deviating from what's really happening to the lake.
- Alan: Current model won't answer questions related to Cyclotella.
- Geoff: We could model Cyclotella, but the growth are dependent on nutrients they receive and that's dependent where flows from streams and drains release them and the depth nutrients being added in is changing as the hydrograph sees more rain and less snow which affects the density of inflowing water is coming in, can produce convincing results with 1-dimensional model but we are increasingly deviated.
- Bob: Be cautious because of the significant investments in that tool, significant programs built around these tools, and significant implementation. Not questioning the sufficiency but there needs to be documentation; why, how, and what has changed? Cyclotella existed before TMDL, and maybe affected clarity in a way we didn't understand. Acknowledging how these factors weren't accounted for, those are voncining arguments that need to be clearly spelled out. Why the clarity model is no longer sufficient.

- Jim: Clarity model and TMDL are very political so be careful with how you word and message. Would not word it as binary, not yes and no. Built the model, has this level of accuracy, maybe not as accurate we thought, if we had this additional information we could fine tune standard deviation. How accurate is it, what additional information will make it more accurate? Is it worth investing money to increasing accuracy? That's how I look at this question.
- Alan: These are important considerations the Political landscape bears on what we ultimately do. The jurisdiction will be sensitive here, the model changes, what clarity credits, do you have to start over? Messaging is important. Part of what we are doing here is figure out how to enhance the messaging as we produce this document? So they accomplish what we want without raising a lot of issues along the way.
- Lizzie: Funding ask in layman's term why would we do this?
- Sudeep: Some of this is addressed in the wording by 3 bullet, it would be nice to suggest what improvements can be made to the existing clarity model to understand offshore clarity. Then perhaps another bullet what other information is needed to predict that clarity. Trying to decompartmentalize and improve existing model to see if we can have more insight into what the mechanisms are for changing clarity. There might be a second step that this model will only take us so far and so what mechanistic info is needed to guide the narrative and why it's not predicting clarity the way it is. Not everything can be predicted just by the model itself which is what we are seeing now. Expand the narrative by expanding bullet 3 into two parts. Maybe we start thinking of nearshore and offshore rather than deep water and nearshore. The clarity model is one component to work in the offshore but the next step is to link the nearshore and offshore process also.
- Geoff: It is confusing because cyclotella are primarily found offshore but in the surface water not in the depth. Emphasize the word "prediction," no one is saying what has been done in the last 20 years is wrong. There was this conceptual model that was built into a physical computer-based model and that guided decision making and a whole program and it's fine. But talking about future conditions, on the ground conditions have changed, and that tool will increasingly diverge from reality. It's not that everything is thrown away, the main thing that is going to change is the physical structure. The way motions are represented, the particle aggregation model, light transmission model, just put into different framework. That's the part we need help. We are not saying anyone is wrong, we just need to do better going forward.
- Bob: here are the realities and here are the short comes. There are strengths and weaknesses. There are opportunities for change, just make sure you say that, I did not read those words.
- Alan: Vision document different from a critical review. Vision document that explains shortcomings of model, is it sufficient?
- Bob: Kind of, expand upon it, the vision document is different from the critical review we are thinking of.
- Geoff: What is a critical review? All this published literature that is pointing out that all these factors are making all these systems 3dimensional, don't understand why we need to review why a 1-dimensional system is insufficient.
- Lizzie: By understanding the shortcomings, we are being able to justify to spending.

- Geoff: Can citations to the literature? Where dozens of people at dozens of lakes are coming increasingly to the same condition rather than a subcommittee saying the same thing as the literature.
- Dan: I view the review as a synthesis of clarity, existing model loading clarity out, as we answer these first questions why are we seeing a divergence winter/summer trend. This should point to changes in the system, such as Cyclotella, it has insertion depth, it has circulations. Drivers of clarity have evolved significantly since the model was developed. Should we be addressing Cyclotella v. physical dynamics of the lake. We think that Cyclotella accounts for 10% and physical dynamics accounts for 80% then it's easier for us to make a decision. Let's invest on the 80 and leave then 10.
- Alan: If we provide references/citations/background/rationale at the front end of the task order is that good enough? Or do we need a subcommittee for a comprehensive review, take a more longer deliberative approach before modeling. Those are two different approaches 1) Establish inadequacy of current model, provide references, and then move on 2) put together a team to evaluates the relative effectiveness and analyze deficiencies of existing model, then say what the proposed model would do, then make a decision from there. Prefers to take 1<sup>st</sup> approach, if agencies aren't comfortable with that, then we have to build the second approach to the task order.
- Jason: Agrees the former makes more sense, interim step, give it to the agencies let it be digested and have a conversation. If there is something we don't understand or don't agree with we are providing an iterative step in between to allow for questions and discussion.
- Alan: Something added to the task order to provide with agency members before executive committee meeting, review determine if what produced is adequate, if it isn't then we revise task order to provide mechanism to address deficiency because we have three weeks to put it together and seek approval (ACTION) otherwise we revise based on feedback.
- Geoff: Regarding the whole percentage of effects 80%, 10% etc. They are all important! We can never give solid numbers because it varies from year to year, based on weather. All these factors are interacting, nutrients where they are going and the hydrology.
- Dan: There is an extensive data record for the lake. There has been an observed difference in summer and winter trends, documenting the hypothesis for why they are diverging, various lines of evidence are incredibly valuable. Prepping summit material, if we had something that summed up summer v. winter, no solid numbers but explaining that long-term trend would be incredibly valuable. Without the firm understanding of what is happening in the system, I find it hard to jump down and start talking about solutions when we haven't really clearly defined the problem.
- Paul: Sounds like what people would like to see is a benefit to cost ratio, which generally does not go into the papers we cite. We need to quantify the benefits of comes with converting to 3D maybe it changes input data required at different locations, more validations.
- Alan: Benefits part are crucial, what are the relevant benefits that come switching to this model, and figure out what can invest.
- Jim: Governor's office won't read a citation.

- Bob: Agencies have been asking for justification in this context and it still hasn't "gelled" yet. Is the time and expertise available? Are the resources available to make it happen? Or is it a second task order?
- Alan: Task order prelude to work order that we use to implement contracts with the participants. Worked with agencies to a description of the work being done. Timeline and cost. Never did this in the past, we have always wanted to have the work order in place to show the executive committee, never been able to do. Instead we always explain in broad terms. We hope to advance the process to provide details about what we are doing, relative cost, products, and benefits of products (why it is needed).
- Bob: Not sure if it is realistic. Happy to work on it, build a sense of what we are going to do and why we are going to do it. Provide enough structure for executive committee meeting. May be difficult to get that degree of specificity in terms of funding and everything.
- Alan: For some of these things it may not be realistic, but some of these things are possible. If we don't, there's a lot of extra work on the back end. Spend months putting task orders in place, by the time we get started we are halfway through the year and we come up against the next summit scrambling. What we can do is this mixed model approach, some task orders for some simpler products, task orders for prelim work before identify the specifics of the more complex tasks. That would be what I would like to see.
- Jim: The urgency of getting something down so the co-chairs can see it in advance, because they might have questions. It's unfair to check-in only once a year. It's imperative for the vision doc and task orders to have review with chairs to get guidance beforehand and be able to make sure you are addressing the correct priorities.
- Ramon: Want buy-in from executive committee to work orders. Is this something you will be tasked with before Alan? Or is Alan/TSAC is developing work order for meeting? This is the work plan development process but what I'm heading now is a slight deviation going back to what we have done before, more structural work plan, is Bob develop work plan we will look at it and decide who is doing what?
- Bob: My ideas are open for discussion, degrees of specificity between task and work orders. What I'd like to see these are the primary tasks for today and those are the tasks we will bring to the regional management team. These are the four things and we say yes that makes sense, but it to the meeting, and then lay out the broader details. There needs to be this level of justification and discussion about why this priority has been selected. We need to find out what the executive committee wants to see. Budget details and stuffs can be back burned and discussed after the summit. Resources on the table and make sure everyone is comfortable with the direction of our intent. Managing this process is where I'm coming from. Understanding priorities what we are delivering and why, all other stuff can be dealt with after august. If we know the tasks then it's enough to get the contracts in place and go with details from there.
- Alan: What we want to accomplish today is the general tasks, then develop the background/justification/rationale that is what we have to take to the executives. But at least we have to identify and agree what the tasks are going to be with the funding for this year and the justification for those. That's why we are going thought these Key management questions that give justification for what we are going to do.

- Geoff: Next management question dealing with algae. Range of them, what are the primary drivers of nearshore algal growth: free-floating algae in that nearshore zone as distinguished from filamentous metaphyton that clumps and washed up on the beach as opposed to the attached periphyton algae. All need light, nutrients, they exist in physical environments. Agencies consider this a priority, to know about them, currently being working on monitoring Metaphyton funded by NDSL. So again, this is the issue here, should TSAC weigh in on this or wait to see how that study ends up?
- Alan: Current nearshore work sufficient? Are there gaps?
- Geoff: Work is driven by budget. Do not have the funding to fill all gaps.
- Alan: What are the primary drivers of nearshore algal growth, what new tools being proposed with address the question? Would they?
- Ramon: Reminds me of developing concept model for nearshore where we talked about all the drivers. These things need to be placed somewhere accessible for everyone. All drivers: temperature, sunlight, temperature, nutrients, etc. Perhaps the question is are there some drivers that are important, some are manageable, and some you can't do anything about? At the same time, maybe they are only interested in the ones they can do something about, I don't know. Many drivers that are influencing of algal growth, that question can be easily answer by that workshop document, I thought it was a pretty decent document.
- Jason: Does the document lay out the controllable factors?
- Adam: If we are dealing with limited resources, this question is broad, can we narrow it down based on work that has been done, what is the strengths of relative drivers of algal growth, which can be controlled? What are the near to medium term drivers of algal growth affected by climate change?
- Bob: Priorities identified and how they link back to the questions. What's being proposed, as I understand it, in terms of all these priorities is not going to answer these questions. Is there a particular task being put forward? How is it responsive to these questions, that is what is needed, and what is the justification?
- Alan: Yes, let's reviews questions without discussion and then we can move on to the next phase that Bob was talking about. With algae, side note a lot of dispute, anecdotal comments that contradicts, how confident are we of the lack of change in the last 20 years. Groundwater: Groundwater v. surface water is that what is causing a lot of the periphyton growth, what are the predominant sources? Nearshore is an important feature and something we are seeing as relative to lake condition. Assuming groundwater is important what is its influence. Climate change: altering Nearshore environment, there is evidence from work from UNR and UCD that show temp has been increasing more in nearshore rather than the offshore part of the lake. Climate change conditions affecting watershed hydrology, in-lake ecology, and clarity. Are there alternative management strategies we are currently not considering that could offset climate change impacts?
- Geoff: If the goal is to not just say what the current state is but how is it going to change what management actions need to be taken. You can only use a modeling approach used to answer these questions, you can't collect future data. The benefit of answering all these questions, but we need to determine cost. How much of a cost-benefit analysis is needed? These are the questions and it really is a modeling approach.

- Alan: Reviewing the notes from last meeting where we identify immediate needs, not open for discussion, we already discussed them last meeting, and then move onto tasks that we think should be priorities for our work plan.
  - Running existing lake clarity model – updating it
  - Forest hydrology
  - Assess importance of other trends beside loading
  - Expand into lake condition model – look at nearshore, AIS
  - Annual workshops to review existing data
  - Assessment to agency partners
  - Supplements to lake clarity model
  - Climate change impacts of ecology
  - Stormwater infrastructure
- We identified 5 tasks that would address all of these
  - Conduct broad assessment of available data to look at divergence of summer and winter clarity.
  - Develop 3D lake clarity model, enhance mid-lake and nearshore, relevant to nearshore conditions, needs to be some discussion about the relative benefits of 3D v. existing model.
  - Identify and fill critical data gaps needed for model and calibration, runs in a way to say something about the critical features of the lake, data that we currently do not have, but depends on the modeling approach we take.
  - Measure fluxes nutrient inflow, developed to address SNPLMA funding to look at landscape scale effects. Coordinate with Lake Tahoe West to determine what has been done and what still needs to be done. If there is anything that can be shifted to the lake.
- Jim: What is landscape-scale effects/changes?
- Geoff: For example, if you remove all  $\frac{3}{4}$  of all trees on the west shore, there will be an impact, what is the impact. The idea is let's choose a watershed, see what the current conditions are so that if a clearing takes place, we have a baseline in place. We will have reduced fire risk, but will harm forest health. How will this affect the lake?
- Alan: Lake Tahoe West has done this work and we are looking to leverage this work to look at impacts beyond clarity.
- Pat: 1) Forest growth modeling over 100 years with 2 different Climate scenarios pertains to entire basin. Prescriptions and management scenarios developed on west shore of Tahoe, but applied across the entire basin. Forest growth, fire, beetle mortality etc. across the basin for 4 different management scenarios in a 100-year time frame summarized with a 10-year time step, that's what's available. Adrian Harpold has modeled snow based on these different management prescriptions. Bill Elliot has modeled sediment delivery as a function of disturbance mechanical treatments and roads and prescribed fire and wildfire. 2) Ward creek, stream gauge, adding on to what Adrian has done, groundwater and stream flow to model to complement the snowpack, flows, etc. Definitely opportunities for add-ons that directly relate to the modeling already done. Continue high-resolution understanding of process and dynamics. And then we have the broad scale basin-wide inferences based on disturbances and it's impact on nutrient amounts and delivery, water quality and quantity etc.



- Geoff: Intent to link with people like Adrian and groundwater modelers to go on a finer scale. Also what does that water and the nutrients do/go? Leveraging existing resources.
- Ramon: Is this hypothetical modeling of forest management activities or is this modeling the system as it is now and looking at changes as result of management activity? Is there new data being collected or are these models hypothetical with observation data?
- Pat: Some scenarios represent the best of our ability using the modeling tools we have. With current management strategy, treating in the urban-wildland interface using prescriptions and prioritization parameters that are currently being applied. The other scenarios change those and use different criteria and different target, that's what helps us understand the degree these management inputs change projection. Basically projecting forward management inputs over that entire timeframe and how that effects forest structure composition, wildlife habitat, smoke impacts, wood products, economic inputs, economic benefits, water quality and quantity. In terms of 2<sup>nd</sup> question, none of these treatments have gone in but Adrian has established monitoring sites used to collect data (new data sites), monitoring network for looking at water quantity, snowmelt and accumulation. Those are in positions where ideally a good foundation for understanding before and after data for expected treatments.
- Adam: Expand upon in September, when presenting on Lake Tahoe West project.
- Pat: Yes, if the objective is to inform the council. Ok no problem. How to proceed with this project based on what we understand, what we have learned, and models/infrastructure have been developed, we may want to do that outside of the council time, it will require a few hours to do justice to that. So sure, dependent on the objective.
- Alan: This task is in flux and will change as we talk more with Pat. We will be developing draft of tasks for the landscape scale funding and sending out for preliminary review. Final thing is initiate early data synthesis through briefing workshops to monitor statistical products and ongoing research. 5 tasks capture priorities address in last meeting, now we need broad concept agreement, these 5 along with the one Adam mentioned, which was to look at a process to keep S2A program alive and viable, to keep it improving it, keep advancing it as we bring in some terrestrial work, integrate with Lake Tahoe West. 6 main tasks looking to put on work plan for August. Has to address key management questions that we already looked at, most of these need justification for how we do that, provide rationale how these address those questions and the utility of product/ benefits. Couple ways to do this, we could look and find the person who are interested in finding the rationale/justification for each one of these tasks, pull those together and send them out to TSAC. Can take first crack now and have something sent out to the entire TSAC. My preference is that we identify someone to take the lead to provide rationale and background for each one of these conceptual tasks. Thoughts? Looking for a one pager, providing context, rationale, and identifies key management questions being answered in a draft outline.
- Bob: Provide an outline, for consistency, will send out middle of next week (ACTION)
- Jim: I'm thinking the letter last year, now management questions. I think the more that thread continues... here's what the executive members asked for last August, here is what the agencies said were the highest priorities, here's our recommendations, and weave it all together will make it stronger.

- Alan: Loop agency members for outline (Bob-yes)
  - 1) Broad assessment of Summer/Winter clarity divergence? Geoff: There are people working on it, Ramon, UC Davis. Alan: So Ramon and Geoff to take on.
  - 2) Developing an enhance lake clarity model, I think it has to be Geoff, Geoff wants to get rid of clarity, just a 3D model with the benefits. Alan agrees don't get rid of the 1-D model, show ow and why the 1d model is still being used, why are recommending this new approach. With Paul Work. Ramon does not want to do it. Everyone will see these and have a chance to provide feedback, not identifying teams, this is just the conceptual and justification.
  - 3) Identify/Fill data gaps for critically needed for model calibration and application. Hold off until we know what we are doing with our models. Ramon says we could link to second bullet you need observational data. [No one assigned]
  - 4) Ward Creek, up in the watershed, from Lake Tahoe West data, migrate that data and then look to fill in gaps, an open question at this time. Need more info from pat before we decide what to do. Geoff suggests that maybe the person we need to talk to is Adrian to see what he has by way of measurement stations is there overlap? Get in touch with Pat and Adrian and try to fill in the blanks to see what is missing? Send that out to the group and then decide what the structure of task should be, but need more information.
- Pat: Adrian already has a proposal written about how to model water dynamics in Ward Creek, something to consider. Not sure how you're looking at how to populated this team, he might have something already lined up to do that, the proposal could help expedite.
  - 5) Initiate annual data synthesis and early assessment briefing workshops, Alan will take the lead and maybe Steve Sadro.
  - 6) Developing CRAFT S2A living document process, Adam to take the lead and maybe, that's more the vision part of document, looking at long-term. Military on the regular basis they have planning for the next 5-10 years but also planning 50-60 years in advance. The craft is that approach, looking at the longer term, not being stuck in the here and now. Not sure what the acronym is. Adam to check in with Alan as he works on, plans to pull out.
- Pat: What is happening with fire and forest? Would there been a deliverable from this funding?
- Alan: No, that would be what is next. The subcommittee needs to develop just like the S2A committee over the last year. Develop the background and rationale. But because of the Lake Tahoe West, should develop quicker.
- Pat: Where would funding come from to do that?
- Alan: Several upcoming funding opportunities. Develop the program and needs and the identify the funding opportunities to support those.
- Pat: Can't imagine in a competitive RFP, funding a forest health science plan for Lake Tahoe, it would be one of the agencies. Just to be realistic this isn't a competitive RFP.
- Alan: Says the planning is part of the 150, operations cost.
- Bob: Will engage with Pat offline and talk about funding the planning part.

- Pat: If it's something we want to do, we just need to plan to support in some way or another. I'm not seeing the fire and forest management in earlier bullets, I only see Ward Creek. Is it in one of these five bullets?
  - Alan: Does not exist in these five bullets. The council recognizes the need for more comprehensive perspective. But this is lake focused, that's why we formed the ad-hoc committee.
  - Pat: I thought that fire/forest management was part of lake-focus, but maybe not, only Ward Creek and activities that may be occurring potentially modelled at that scale which we really don't have from Lake Tahoe West. Not trying to tie these in.
  - Alan: Will be discussing this further this needs to be flushed out a little more. Between your discussions with us and discussions with Bob we will be putting some meat on those bones. What we decided at that last meeting was that questions related to broader assessment of basin and watershed ecosystem health will be addressed as directly related to lake conditions, but beyond that should be considered as a much larger comprehensive assessment which would be pursued subsequent to this S2A effort. That's why there is a subcommittee.
  - Pat: Were you seeing value in understanding upland dynamic around the entire basin with the lake clarity set of questions? Alan says yes, to the extent that it is currently available.
  - Geoff: Two separate projects, the Ward creek is responding to the SNPLMA water funding where it's proposed we look at a hydrologic and nutrient budget based on measurements where it goes in the lake. So, forest is creating a benchmark, so that things like forest treatments and smoke starts to populate that knowledge. It's meant to be a comprehensive forest study. We are relying on Lake Tahoe West for that background and all the other work that has happened.
  - Meeting adjourned.
  - Thursday, September 19 – does that still work for everyone?
6. Wrap up, next meeting date/time and agenda items