

Meeting Agenda

Tahoe Science Advisory Council

Thursday May 21, 2020

10:00 AM – 1:30 PM

Video Conference

Join Zoom Meeting

Participants: Sudeep Chandra (UNR), Adrian Harpold (UNR), Alan Heyvaert (DRI), Adam Watts (DRI), Geoff Schladow (UCD), Steve Sadro (UCD), Max Moritz (UCSB/DANR), John Melack (UCSB), Joshua Wilson (PSW), Ramon Naranjo (USGS), Paul Work (USGS), Jennifer Carr (NDEP), Pat Manley (PSW), Elizabeth Williamson (CNRA), Jim Lawrence (DCNR), Robert Larsen (CNRA), Alison Toy (UCD)

1. Welcome, agenda review, introductions
2. Council Operations (closed session): Not including upland ecosystem because it will be discussed in greater detail later.
 - a. Task Status
 - i. Water Quality Thresholds: Project done by Alan and Ramon with Dan Segan. It is about wrapped out, draft to be sent out to the council next week.
 - ii. Summer/Winter Clarity: Paul/Ramon give update.
 - Ramon says we have... 5 hypothesis questions, on the 29th, still have a little editing. Should be coming to the council for review, don't know if we want to review beforehand or a concurrent review?
 - Paul hasn't thought about that, more focused on meeting deadline. Have done a draft for all section. Trends in clarity, address 5 hypotheses. USGS has some obligations in terms of review that has been in discussion with Ramon. Expects lots of comments for review at the end of the month.
 - Alan would like the council to have a look before it goes out to a broader audience. The Agencies are specifically interested and in wanting to know what we see, what it means to them. Would be good to bring them in sooner rather than later. Annual clarity results will be announced somewhere near the end of the month.
 - Geoff says, yes, something like that. Asks Bob, we're scheduled to release the draft of this summer/winter report at the end of the month. Does not have polish and thought, can we get a week or two extensions. It can be hard to take a comment back, how critical is it for us to meet that May 29th date?
 - Bob doesn't see why not, might be a conversation with NDEP, since funded through their resources, conversation regarding contract timing. I don't see an issue and there may be some benefit to pushing it back. Let's circle back to NDEP.

- John would like to endorse what Geoff is saying, it's going to be a draft...
- Bob agrees, circle back to NDEP and make adjustments to contract timing. It's just a couple of weeks, I think we can make that happen.
- Jennifer, sensitive to those points, if the council wants to peer review timing, don't know contract timing off the top of head, but thinks it would be completely reasonable.
- Bob to check in with Jason and Jennifer.

iii. S2A Uplands Ecosystem

- Adam says we have put good work in the last few weeks. It is in rough form, when it goes out to the stakeholders it will not be perfect, but expecting to incorporating feedback from stakeholders. But would like it to be better.... We have a colloidal deadline, sometimes hard/soft, originally out by June 5th but contract deadline by the end of June. Shooting for that June 5th deadline. We recognize the summit happening, want it out by then, something to be proud of. We would like this afternoon to get feedback from council to allow us to deliver a document for stakeholders on June 5th. Final bits by June 30.
- Alan thinks it is on a good time frame. Once the council feeds in, next step will be to work with Bob to work with agency reps, Jim, Lizzie, and Jennifer. Start pulling out things that do fit with available resources. Need an umbrella look of the benefits of developing a science program for the uplands would be and target high value areas. We are on track for that, real deadline is to have a polished project for the summit, which may or may not happen.
- Adam thinks we could spend some productive time on areas that we are coalescing on ideas that of where to invest funds in.
- Pat thinks it sounds great and appreciates Alan's perspective, it can be tough to put out something drafty, but it's malleable which is advantageous. Appreciate and continue appreciate the feedback for working out the pacing of formalities of timing, what does it mean incorporating in the next manner of work, looking forward to that.
- John makes comment about using Zoom for large meeting, using raise hand function. In regards to the document, it really requires major editing and restructuring. The writing style. Previous one has a nice summary of each section. Think about how to make this look like an integrated, fairly well-thought out document. Not nearly ready for public consumption.
- Adam says John made some prompt responses. What we hoped in the last several days hoped to have it collated so that it speaks from one voice, but we didn't get that. That will be the next steps.
- John is not being critical, but bringing it up now, when we have discussion with stakeholders there are a lot of good questions that can be raised and don't want to get bogged down in structural and stick with content. So make it clear during discussion, say that you are planning to restructure.
- Adam says what will help to have discussion focus on the process and outcome rather than the report itself, which should help.
- Bob appreciates Alan's comments, happy to work with group with the next steps, see which projects are floating to the top with funding, the hope is to id these priorities and advance needs.
- Adam in terms of process it will be a great next step. Looking forward to banging it into shape.

- Pat, questions about funding. My guess is that we don't want to focus on funding amounts, content when it comes to stakeholders. As patchwork as the report is, but those who have worked on it, feel good about the three research areas it did get a fair amount of thought. What we will do this afternoon where we can point our bough, we can make more progress that you think in a dollar context. May seem like a laundry list, but we have a lot to work with in terms of data and capacity. We do feel like even though they seem pretty big, we are confident of what we can do in those topic areas. Get everyone's feedback, but that is the concept at least in the 3 main topic areas.

b. Budget update

- Bob says no real updates. We do have funding for 2019 work plan approved. There are still some projects pending. The big ticket items where we have funding set aside. The council has a reserve of resources, when looking at ecosystem S2A we have some flexibility. We will work with all of you to ID priorities. The council is in a great place, we need to continue to put foot to metal and keep up to date. NV license plate grant, has arrived in contract process with TRPA, looking at VMT and other threshold issues. Led by UC Davis researcher outside of the council. Other big sources SNPLMA, going over projects where funding hasn't come through. We need to start advancing work we have been funded to do.
- Include meeting invites in outlook.

c. State updates

- Jim says funds from NDEP and license plate funds. Started to get pier and buoy fees coming in. As we move forward hopefully can leverage fee increases. Moving forward our goal is to get a line item budgeting in the state, it's going to be extremely difficult going forward. Where we are with the state of NV, going with 4% cuts across the board for this fiscal year. Looking at 14-16% cuts for... it's in flux, will need to keep monitoring. Appreciated Pat's comment, even if funding is strained going forward there are still ways to... future research should be using past data, demonstrate that we have foundation in place, it's value added on top of that. I will know more after the Governor's press conference this afternoon. Do our best too continuing advocating for the need of science in the basin.
- Alan appreciates capitalizing on past data and building on that...
- Lizzie what Jim says, she echoes it. Governor 54.3 billion shortfall. Cuts across the board 2021-22 fiscal year, probably a 5% cut across the board. But delaying it a year so we have time to prepare for that. Lots of the proposed cuts, wouldn't need to happen if the feds can step in. Working on a strategy there. For this group, leveraging previous work that has been done, because we are not looking for new asks. The Secretary made it clear, we're not changing strategy, keep building on foundation will be the strategy. Partnerships will be key; it's been grim this last week. The secretary is motivated to keep going, it is important that work continues, and be more creative than ever. When budget comes through maybe there will be positive news of federal funds.
- Alan appreciates the honest perspective.
- Jennifer adds an up note, NDEP perspective we are not a general fund agency, federal funds are stable, we can continue to work with you that might fall under 319 or 106. No way that any of the watershed in Tahoe fall out of the lotus, all will be eligible under 106 under definition of waters in the US.

- Alan yes, we need to be creative about how work is being done up in the basin. There might be stimulus funds coming in, keep us posted. WE can work with you to ID opportunities and needs.
- Bob there have been questions about stability of the SB360 funds. Confirm with resources there is no concern of those funds being used for anything else.
- Alan assumes this is the same for dock and buoy funds.
- Jim yes, thinks it is true. It was a long arduous political haul. Finally went through. WE are getting sued, but there's no injunction. As far as I can tell the money is safe. Takes a while to come in, billing is an annual cycle. Funds come in whenever they get permit, but hoping there will be money to tap into either next year or later this fall.
- Alan thinks it's useful to hear about state perspectives about Tahoe.

d. Pending Work Orders

i. Lake Tahoe data synthesis and analysis

- Alan: Companion project to lake clarity. Summer/winter clarity was ultimately pulled out for additional info needed about the evident improvement of winter clarity and decline in summer. Now as this project is closing on, we need to look at this.
- Bob gives project description, very general but provides opportunity for annual review and assessment of the data collected. An annual workshop with agency partners of how do things look, conditions of the lake. Ad hoc to annual clarity, but a broader discussion of the monitoring data collected, how that data helps uniform the system, and how it helps inform the agency/managers. What does it mean, to create an annual gathering in a tangible way that is useful to partners?
- Alan says we have had biweekly meeting with various folks, council members and others. Sharing data has contributed a lot to the project. The work orders solidify that process. The data around Tahoe is looked at on a regular basis, using it to inform our understanding the changes in the watershed, develop statistical models of the short term consequences. Track the trends and directions of the changes closer to real time. Writing up a draft work order and sending it out within the next month so we can start putting that project together as we close up summer/winter clarity.
- John thinks it's very good that we are doing this. There is clearly an overlap between the modeling activity, upland, and this work order. While they can't be directly link, but seems good to point out the connections in the work order.
- Geoff says it is concerning to say real-time assessment of data. I don't want people to think that it is actually possible. All of it has inherent lag. This would take place once a year all that data in the basin but also projections from other groups like the weather service. Need to figure out scope before we circulate.
- Alan says yes, some things have varying lag. Collate info as it becomes available, just to make sure that we are trying to streamline the process as much as possible. Workshop is once a year, but the background information is something to will be ongoing. Try to describe in work order, if you see an issue with the

way it is being presented, be sure to point that out in the work order to make it effective over the long-term.

- Jim says the conversation is timely, clarity press releases the 2019 clarity findings, and background working document that goes behind some of the data. Dr. Laura Heyvaert as climate scientist, ... beneficial to the basin, we get the data, we synthesize it, is it peer reviewed, I think we all know. But without having the process laid out, moving forward that would be good. As you're putting the work order together, worthwhile to include those thoughts.
- Alan says yes, regularize...
- Ramon just wanted to hear from Alan, is the intent to estimate the annual clarity, average summer clarity. What is the ultimate goal of this?
- Alan says statistical... working with data as we are working with summer/winter clarity to see what is feasible.

ii. Sustainable Recreation (SNPLMA secondary funds)

- Alan recaps Funds available this time last year, then snags with federal shutdown. Still waiting to see those funds allocated. Working with LTBMU working on mechanism to reduce loss to overhead. LTBMU trying to get to funds to TRPA for reduced overhead. Alan been working, but requirements keep changing. The latest, if we can get in the proper letters before the end of the month, they will be able to get the funds transferred to LTBMU. That's where we are at, I'm optimistic.
- Jim is happy to help. Independently had a meeting with BLM state level. Took it upon myself to bring it up. Said they would look into it, didn't hear back. But if it continues to get held up, I'm happy to help.

iii. Landscape scale impacts on Lake Tahoe (SNPLMA secondary funds)

- Geoff and Alan need to talk offline to get info about the landscape scale funds

iv. Clarity Model Enhancement

- Alan Another project in our work order last year. Haven't tackled yet, other projects took priority. Need to get started bob has started draft work order. Important to get council engaged about what are looking for? What do we need out of this particular project? Have discussion and have a broader discussion after break.
- Bob thinks waiting after summer/winter group to provide some framing was a good direction. It is clear there are lots of options of how the funds are spent. \$250k for "enhancing clarity model." It's a model of nested models... most critical and where we go from here is unclear which is why I sent a summary, in S2A plan of 2019. Lots of discussion of models with suggestions of where to go. Given available funding and need to provide valuable products. What are the needs and priorities? How do we proceed? Geoff has the history and knowledge.

- Geoff there was a lot of language presented as part of s2a plan presented at executive meeting last year. Some of the language was used because it was appropriate because we need a new model was too big of a leap. SO its about enhancing the existing model and there are lots of parts of the exiting model that are fine. Comprised of different modules and models, existing hydrodynamic system. To say that we should tinker with nearshore fish system, it doesn't matter if the underlying hydrodynamic model isn't changed. It is 40 years old, at the time it was the best approach, since then more things are feasible via 3d modeling, questions are no longer the kinds of questions driving the TMDL process. That's my perspective, trying to create a tool that serves the basin, the committee that framed that thought the modeling requiring \$250k per year. But not what was considered desirable when the plan was formulated.
- Bob, what is the cost of the underlying hydrodynamic model? What can be done with the \$250k as it relates to the need.
- Geoff thinks most of it can. But there are different questions different agencies have. Not all can be complete in the scope and timeline of project. What is the long-term need? What capabilities does it need to have? The hydrodynamic model with current resources we have, often these things fall with whatever data we have. Only will become apparent through the process.
- John is confused about the procedure. WO not to decide whether we do modeling, thought it was analyzing where are we with the modeling and data requirements. I thought it was a 2 step process, bunch of submodels. Can make an argument that the ecology depends on it, not obvious to me that the first step is a 3d model, its part but not the obvious first step. WO give us a chance, the S2A didn't talk about the watershed, thought the purpose was to step back and not decide what is most important, but provide some evaluation of where we see the most models and which one is the biggest bang for our buck. The beauty of the S2A we have a good summary of what is being collected, nice summary of existing models and documents. Having this information, council needs more time, time frame is a couple of months. I thought the discussion about the work order not deciding going one way or another.
- Bob, multiple work orders going at once. Larger WO to allocate \$250k to do work. Then these other questions came to light, \$15-\$20k smaller work order to do a smaller assessment, but is that the best use of time and resources? Is there a clear direction and we can just move forward? Or do we need a smaller assessment? Agency members want to see the work and where we're going. My hope today is to hear from the council, agency partners, and then make some decisions in terms of next steps.
- Paul comments that one of the things we are finding in current work, there are some time series that are lacking, in our reports we will mention that. The kind of modeling Geoff is talking about; it will depend on how good your data streams are. If there are issues with your streams, it can add some uncertainty. Better knowledge of this will inform the model.

- Bob thinking of the modeling needs in the context of available data. There have been hypothesis about the ecological drivers of clarity. The clarity model as it stands inadequately addresses, food web, flow of particles, phytoplankton etc. Seems important where does it fit in the priority in terms of the hydrodynamic modeling. That's the other question we need to ask.
- Sudeep echo a little bit of what John was talking about. Not prioritization, updating model is important in terms of answering important questions... Think that these ecological questions may not be answered from a modeling framework. Significant data gaps because of lack of monitoring. Multi-step process should continue. We want to update model and step back and what key insights are we lacking. Linking back to upland ecosystem, maybe the right moments to make the right moment of water land linkages. Feedbacks that feed into the model... food web questions, near shore productivity and offshore. See this as parallel efforts, make this an activity that moves into next year reporting, whatever the focus.
- Jennifer, what Sudeep said was perfect. In 2018, there was some angst in implementation of TMDL, wondering if we are putting our money in the correct place according to clarity. Are there other activities that need funding applied or is it the model? Given the understanding up to date, it is critical for us to answer questions. Anything to improve the model so we can answer questions is critical.
- Geoff back when TMDL development and model created, it was nutrients and fine particles were the only thing considered for clarity and clarity was the only thing of concern. But that has changed, the model phytoplankton... said they were being grazed, we didn't care about them. If we are now concerned about these other variables, these are the sorts of things that can be modeled. It's always difficult to model these things, as our understanding has increased over time and the appreciating of the important things in the ecosystem. The Model will not provide new data, but it will inform our understanding based on imperfect data to... testing hypothesis that area experts may have.
- Alan says we all agree we have a need for a good model. We need to keep our models updated, if we are using them up to date. We wouldn't be watching a weather report using a model that was 40 years old. Constantly using best models and data given the resources we have. We do have very specific needs, we know we need an updated clarity model and we would like to add some... and if we spend more money on other projects then there's less funds for the updating of model. We are all committed to using best available models and keeping them updated, that's not just scientists it is a commitment on the resource side as well.
- John the discussion seems to be consensus focused. Models are tools, they're always wrong, but a good way to structure thinking. Heard from others about data needs, but these models provide us a structure to work in. The limitations are that to do the proper updating of model, it's a big job. It's multi-year, the challenge we have, not spending a lot more money of thinking where to go.

Don't think there is one direction to go, given a long-term perspective, what is the best strategy. To truly update the model, it is multi-faceted, huge part of it. Not trying to spin wheels forever, just additional documentation in terms of needs and modeling needs.

- Bob it is good to think of the value and need is. The importance of updating our tools and modern and up-to-date models. What we are challenged is to demo the use of those tools The clarity model as it was used, was tangible application immediately. The broader need for updating the tools for system understanding, there's that. Then, what are the research priority needs for resource partners, if it's beyond model update then we need to hear that. Questions of lake responding to load reduction, enough confidence to talk about. Lake clarity and its response to... are clarity aligned with needs, watershed modeling, load modeling, or specific food web research. Those are the questions going to ask. How does it help the resource community advance their needs?
- Alan says that's an even bigger question, but we do have to be ready to answer.
- Pat thinks this is an important question, what is the prioritization process, why are these priorities, we have funding but we don't know how much. Coming up with criteria that explicit for what we have control over and that factors into building models that explanatory or predictive or both. Take a pause and build some sort of transparent decision process, not just for this project but we will need to do this again and over and over. Now that we have S2A plan for lake and good progress on the upland plan, think we are positioning ourselves competing for limited fund sources, this idea of top notch models may not be something we source locally, get enough traction of how to think and study it. Don't know the sources are, but would like some time to think about that, targeting external funds.
- Alan capitalize our notoriety at Tahoe to leverage funds.
- Alan tasks Geoff to work with Bob for a short term work order to look at the modeling and what it will take to get the most benefit out of lake clarity modeling. Need to go into August with executive meeting with clear direction how we are going to do this. Even if we haven't done it, definitely where we are going to go. Any last thoughts?
- Geoff says he will work with Bob. This discussion has been very good. Likes the idea of a process of the modeling that the full council can engage on, not just a subcommittee. I think it is important for all the reasons mentioned these reasons that change and evolve based on agency needs.

3. Break

4. Upland Ecosystem Science to Action review and discussion (open forum)

- Pat Manley presents, both terrestrial and aquatic systems, a basin-whole system. Lot to wrap head around.

- Explains purpose and need for this S2A upland plan in the climate context as climate is a major driver.
- Resilience is an important focus for restoration activities in the basin, productive way to think about the desired outcomes.
- Socio-economic system, not just looking at plants, trees, looking at people as well.
- Where are we going? Target conditions are what we want and what is possible. Three different strategies to think of how we are going: resistant, adaptive, transitional. Thinking of how to direct research in order to achieve the desired outcomes.
- Adrian discusses approach
 - Integrated research, building on existing data and successful work. Cross-cutting themes to apply to any project with a management focus, i.e. quantitative metrics, decision support tools, engagement with stakeholders and public, etc.
 - Came from synthesis of work: Watershed Assessment 2000, Integrated Science Plan 2010, SNPLMA Science Synthesis 2016, Climate Change Vulnerability Assessment 2020, and Tahoe West Synthesis Report 2020.
 - Combine all research questions and ranked according to eight pillars and ones that hit on multiple pillars
 - We didn't prioritize but we ranked what rose to the top
- Pat discusses 2021 research investments in phases 1, 2, and 3.
- Adam talks about the co-benefit for agency stakeholders from this integrative system.
- Sudeep discusses first research investment looking at ecosystem linkages between forest, riparian, meadow, stream and lake systems.
 - Identified questions and linkages
 - What type of biodiversity that we are trying to maintain? Where might we see a loss of species?
- Adam discusses next research investment: forest health and fire vulnerabilities and target conditions.
 - Summit takes place amidst a wildfire, smoke is sometimes present
 - Agency action for fire, falls on a line of suppression and response versus mitigation
 - Air quality can influence COVID-19 conditions
 - Identify relative costs and longevity of various fuels reduction programs
 - Improve understanding of prescribed fire behavior
 - Investigate fire as potential sources of nutrients and fine sediments into the lake
 - What are desired conditions?
 - Forecast future fire conditions in the upland ecosystem. Take into account the uncertainty of future climate and environmental responses
- Pat discusses third research investment: biodiversity vulnerabilities and landscape linkages
 - Not a standalone, integrated with other topic areas.
 - Good amount of work done by the Tahoe West group, but that was specific to the West shore of Tahoe.
 - What's happening basin-wide and where are there sensitive areas?
 - Coming up with projections about change in habitat for aquatic species, how can they move, potential barriers to change, linkages in interactions, and how will they fare over time?

- Like the other investments, is a model improvement and tool development component to it
- Adrian discusses phase 2 and 3
 - Phase 2: leverage results from phase 1
 - Phase 3: Once we have integrative model, then continue to improve foundation and identify and prioritize gaps
- Start of feedback, ideas, suggestions, and comments:
 - Alan asks if you had the option to start with something now, what would you focus on? Where would you start?
 - Adam says with several collaborators we would all potentially have a different answer.
 - Alan says that you have collectively gathered ideas but have not prioritized.
 - Sudeep in this initial stage we didn't want to force anything into a box forests, lake, etc. Research priorities are identified across the classic categories, but it's integrated to look for linkages. Highlight linkages and resist the temptation and just choose to narrow the focus.
 - Alan says in the end you will have to highlight something. Done in a way that is respectful of this larger context we are trying to incorporate.
 - Pat says we wouldn't choose one of these three things. We would scale it based on inputs and drivers to the system, what are the highest priority drivers and go from that perspective to keep this integrated approach.
 - John Melack asks in phase 2, an integrated model that integrated fires, streams, run off etc. Do you have a model structure in mind that might help prioritize what you're doing?
 - Adrian thinks it is a fair question, Reese's model, linked coupled model, taking that and linking another model to it. Link the output of two models through a decision support model. Thinking broader than that. Earth systems model and Reese's are an opportunity for us that hasn't been applied in the basin.
 - John saying there are modeled structures that could be employed, so you're not starting from scratch.
 - Adrian says the Tahoe West Model and then runs Reese's as part of what Adam described. Then it is part of that integrated model.
 - Pat says we used Landis Modeling, forest fire, beetles with outputs of carbon, etc. Make inferences about wildlife, water, smoke, etc. Adrian build the forest snow model. Set those up at different resolutions and set... how climate is pressing on those. Quite a few models that have been used in the basin already in tune with basin, bring them together to answer these...
 - Max comments, if we did have a modeling framework identified that were good options for phase 2, it could inform some of the phase 1 questions.
 - Patrick Wright what's the thinking on budget?
 - Pat says ballpark somewhere between \$300-400k, standard with multiple institutions and researchers. So we were thinking \$1 million. That's the best answer we have at the moment.
 - Patrick would be interested in having a discussion along with forest service to see if we have the funds and how is it link to interagency processes. Moving

from Lake Tahoe West to Lake Tahoe Rest. The more we can tie this to an agency need, the greater the potential for funding. The key tradeoffs and issues, obvious one I didn't see, was for prescribed fire is public health as an example. One area the agencies might be interested in. Similar efforts, Mike Dettinger interested in doing further down scaled models, how is the East shore different etc. Get some of the agency leader with team to talk about how we can move forward together.

- Adam on the point of smoke and public health, lots of discussion about how far we go from the environment, and this is useful feedback, if this is important we can incorporate it. We have resources and people to leverage that kind of question in the basin.
- Pat for inter-related dependencies that drive this upland ecosystem is one of the reasons we want to go basin-wide. Then leads to upland-lake interface, difficult to do piece by piece. One of the conclusions from Lake Tahoe West, the west side of the basin is unique in terms of productivity among other things, the rest of the basin is probably going to respond differently.
- Alan asks given that the East Shore, less soil moisture deficient, more fire?
- Pat should we prepare for mortality? For fire? Want the modeling to support that.
- Sudeep the scale that we are trying to work, while important, we will have to make decisions based on budget at the subwatershed group. Has been delightful because we learn from each other, next steps will be to highlight the scale we are trying to work, the models that might guide some of our work, and what will come up, what are the maximum co-benefits we can find. What are the key questions managers are still thinking about? What are the co-benefits we should be looking for? Then we can go back and forth with this. This could greatly change the budget where it's \$1 million per.
- Jennifer potential drought and mortality in Nevada forest (NDF). Wondering if the USFS is already engaging with you. Do you want me to push this out to forestry?
 - Pat says it would be great to get feedback to actively engage stakeholders. In the time that we have between now and summit. What kind of feedback would be most useful between now and then? Beyond that some additional ideas for how to do that would be great?
 - Adam says we come up ideas that we think are priorities but then want guidance from agencies if we are on the right track. It is appropriate to start reaching out so we can get that feedback.
 - Alan thinks it is important to have management needs in the plan. If it doesn't address needs, then we aren't accomplishing what we need to do. Let's figure out how to make that engagement happen with Bob and the co-chairs.
- Jim we want to keep engagement with NDF, wants more engagement and bring from Dr. Avert perspective. Appreciates thoughtfulness of putting this together building off previous work that has been done. Money is going to be tight and we need to show integration and its value added. Regarding forest health and climate change, time factor? We model and project time out, what conditions may or may not be like, in the

meantime we do have forests that are overstocked, always operate under drought conditions, it's great to project, but we want to manage for healthy forest in 2021 and 2022 and how it will then apply further down the line.

- Pat says that's a great question, from Lake Tahoe West in particular, these long view perspectives help us figure out our direction, whether it's mechanical thinning, hand thinning or prescribed fires. We have a much better handle on prescribed fires, like target conditions, we can map that basin-wide right now, that's how we can inform current activities, but how much you do and where, that's where the long-view helps. From an institutional or landscape scale... we can have a lot more with these investments.
- Sudeep, same question could be asked for NDW, with the impacts of Lahontan Cutthroat Trout, if you talk to your forest team also talk to the biological team. Poor decision for where they are re-introducing, thinking about recovery in the long-term but does raise immediate management questions.
- Jim wants to talk about sage grouse too!
- Adam for phase 3, this is important and tough issue, all is predicated not just of forest health now, but then hydrology and fire risk. Looking at all those potential effects... treat here, burn here, combined benefits... that's what we can provide in phase 3.
- Jim brings it up, because these are the kinds of questions that I will be asked. Especially for people more concerned with the immediate rather than the long-term. Humboldt-Toiyabe when you look at land ownership pattern, want to tell the long story, small geo area and the whole thing is prioritizing and it's just about getting crews out there. If we can tie immediate actions to future goals and tell the story of how we are working collaboratively, it will help me advocate for more funding.
- Alan says draft has gone out to council members, send comments back to the subcommittee. Bob will start working with subcommittee to figure out agency member to solicit thoughts and perspectives. Integrate those by August not only science and framework needed but how this will address management needs in the future and now.

5. Lake Tahoe Clarity Model Enhancement – project priorities and direction (open forum)

- Alan opens to agency members to talk about questions, needs, and perspectives
- Bob summarizes AM discussion. Need for models and tools to understand the constantly evolving system. What is most important research needs to understand lake clarity holistically? What are the greatest values you see or need?
 - Jason asks, the carbon based model moving from chlorophyll to carbon. Explain in greater detail and while it's going in that direction?
 - Geoff says that chlorophyll is surrogate for plant biomass. Because of Tahoe's clarity the ratio of chlorophyll to carbon is highly variable across the lake. Modeling chlorophyll which is not a preserved quantity has a lot of uncertainty. Part of the way we quantify algae by using sensors that are responsive to light and chlorophyll. Carbon is preserved and chlorophyll can be very ephemeral. Trying to make it more rigorous.
- Bob pulls discussion back, to understand, is shifting to a carbon base, is it a priority?

- Dan says going back to the overall context and motivation for the summer/winter clarity to the record low clarity of 2017, the basin has 40-50+ years of load reduction, sewage reduction, large-scale SEZ restoration, etc. despite upwards of \$1billion, we are not getting the results we want. Coupled that with the observation from SOTL, saw the decrease in tandem until 2000, should managers should be taking credit for load reductions. Or is the TMDL frame the entire problem wrong from the start? As you start thinking of next investment, what do we do today? Is anything that we are doing working? Should we be doing something totally different?
- Bob should we be looking at load estimates? What are the lines of inquiry that we can lay out to get at the answers to the kinds of questions that Dan is asking?
- Geoff says that if we look at load reductions, it doesn't really advise to actions that management should take. For the improved model, it's not about the prediction but what can it tell you about the system. The fine particles it wasn't through monitoring; it was through modeling. Should we put our eggs in another basket? That would be drastic.
- Alan agrees, there's a red herring here, you use the model... set a program that analyzes both. We haven't been updating models and we haven't been collecting important data that we need. Hoping summer/winter clarity will report on that and begin to make that case in combination with the work order how to prioritize where to allocate resources to improve the current tools we have.
- Bob asks Ramon or Paul to weigh in on Summer/Winter clarity, is there anything popping out in terms of priorities or drivers?
 - Ramon says as a first cut, this divergence in clarity, very targeted question from agencies, geared those specific variable *Cyclotella* being one, loads being another. Gathering all the data needed, what is the data actually saying about these drivers. With the data we have we can see that hydrological processes are important driver to clarity. Clarity model has to be supported with observation data, otherwise you have significant uncertainty with what you're trying to predict. Whether or not management that has taken place has resulted in improved clarity, it's difficult to say, not a lot of urban road data to show that. But what we can say is that we find a number of parameters associated with clarity, in that effort, we can incorporate with other task order to predictability of clarity that we found to be important with the data we have. As we go through next couple tasks order it will be informative enough to know if the existing data can be incorporated into the model... sediment from streams, what current status of nutrient loads from streams, but only part of the story. There's still work needed to get at those questions.

6. Wrap up, next meeting date/time and agenda items

- Alan thanks everyone for participation, we appreciate all perspectives. Feel free to get in touch with a council member or Bob
- Look at S2A Upland draft, getting threshold reports soon and both need review. Start drafting Lake Tahoe Data synthesis to be sent out for review. Geoff to work with Bob for modeling review and we will want all that done going into the meeting in July.
- Scheduled for July 16, Bob to send out calendar invite again.

- Closing loop for developing products for executive committee meeting. Bob to work to draft up presentation materials for the meeting.
- Regional management team scheduled for next month and that will be some of the main agenda items.
- Will still be working on the 2019 Work Order into next year. From a funding perspective, looking at investing funds in the direction of our current trajectory, it will be a matter of demonstrating utility.
- Geoff felt uncomfortable about the \$1billion question, it has not been spent for naught. Had those investments been made, this conversation would be moot. The outcomes have been different but they have been worthwhile.