

Meeting Notes

Tahoe Science Advisory Council

Thursday November 21, 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: Adrian Harpold (UNR), Alan Heyvaert (DRI), Geoff Schladow (UCD), Steve Sadro (UCD), John Melack (UCSB), Pat Manley (PSW), Ramon Naranjo (USGS), Paul Work (USGS), Jason Kuchniki (NDEP), Jim Lawrence (DCNR) Robert Larsen (CNRA), Alison Toy (UCD); Jack Landy (EPA), Mike Dettinger (NDEP),

Not in attendance: Max Moritz (UCSB/DANR), Adam Watts (DRI), Elizabeth Williamson (CNRA), Sudeep Chandra (UNR), Joshua Wilson (PSW),

Agenda

1. Welcome, agenda review, introductions (Geoff)
2. Council Chair rotation (Alan/Geoff)
 - a. Alan: Co-chairs have been in place 3-4 years, Geoff and Alan. Originally the intent had been 2-3 year appointments with a staggered distribution to maintain continuity with duties. Last year Geoff offered to rotate out and this year, Alan is offering to rotate off, and in fact, really needs to rotate out. In order to make the council function well, we want all members to be able to serve in the capacity as co-chair. Opportunity to work with agency members can get the council more functional. Something to consider. Opens it up to topics relevant to the co-chair. Not trying to determine new co-chair, next September after bi-state meeting, new chair will rotate in.
 - b. Geoff: No specific rules for co-chairs, other than generally agreed that there would be co-chairs. Sometimes you can't make the meeting, having two co-chairs provides flexibility, previously one from NV one from CA, principles are good ones, but not defined.
 - c. Bob: Extends appreciation to Geoff and Alan. All members have opportunity to weigh in. Period of transition and then announce at executive committee meeting. Intent is overlap, we can have a discussion, could discuss rotating out both chairs. From his perspective please weigh in on the roles and responsibilities, and how we choose new chairs. Hopes to alleviate some of the work and carry some of the burden. Opens up for discussion.
 - d. Pat: There has been a fair amount of turn over. 1) in terms of timing, think of it as the state fiscal year, so ahead of the summit or before that. What is the transition period and how do we navigate that? Hand-off happens July 1, so that exec. Meets, it's with the new chair(s). So that things are well in hand before summit. 2)

co v. not, could go either way, how well did it work? Appreciates sharing burden and lots of merit in that. Likes that it represents a variety of values and perspectives. Good to have some diversity. Thinks it could work either with chair and a deputy or 2 chairs, but needs a fallback. Two positions necessary, but the juxtaposition is key. We have working groups/subcommittees. Actual functioning of council overall, might be a niche for another role, but maybe down the road. We have enough continuity and understanding in the group where we could handle turnover.

- e. Bob: Has developed roles and responsibility document, provide some new structure we haven't had.
- f. Steve: Ones that he has seen worked, looks for a nomination, some continuity with a structured timeline. There's nothing to preventing re-nomination, no inherent restriction for people to serve beyond rotational period. It has a nice flexibility but also has structure to maintain continuity with rotation. We don't have to ascribe difference in chair co-chair duties.
- g. Jim: State of NV perspective, when SB360 rolled out, lots of conversations with Todd Ferrara and John Laird, how to bring the two states together. It was critical to have two chairs one from CA and one from NV. If it wasn't that, it was a non-starter, that's how it got set-up and I think it has worked well. Thanks Geoff and Alan for getting the council to this point. Now times have changed, more trust between two states, less legislation coming out that is uncoordinated between two states. Not sure if it is as important to have two state reps other than the fact that NV is still working diligently to bring funding to and match with something that is at least equitable. The optics having the two chairs and diverse representation goes a long way. Not telling you what to do, but some back story of how important it was to NV for representation to be dual. Doesn't matter fiscal year, whatever works operationally.
- h. Alan: Something to be said, rotation right after bi-state executive committee meeting, responsible for presenting work plan, opportunity to demonstrate products, and progress made and then introduce new co-chair, it would be a natural transition time. On the other hand, has always been issues with funding because things are tied with the state fiscal budget because there is extra funding provided to the chairs. But personally thinks that it should be done by the executive committee meeting.
- i. Bob: From a fiscal standpoint there is some flexibility. Alan brings up a good point that one of the most important things is for the chairs to present the work plan to the executive committee. It might be nice to have a person identified and engaged in the process, so that they can take ownership of that work plan before the bi-state exec meeting. Work with new co-chair moving into Executive Committee meeting. How much time we stretch in front of the meeting is up for debate but make sure we don't put the new chair in a tough position.
- j. Geoff: Proposes July 1 for deadline, not that the outgoing chair disappears, but then Alan would be speaking as former co-chair and new chair is introducing you to report on. This would be a hard date, but as Bob says, we have flexibility. We are all busy, working with Alan, it was a lot easier to equally share (+/-) these responsibilities. That way we are both responsible, the idea of having equality between the two worked well for us, so more vote for equality of role, it was also

great to have someone there as a sounding board. Which then was brought to you for comments and response, it worked well for us.

- k. Alan: Agrees, had a good opportunity for discussion, various issues with topics with meeting, products being produced and bringing to the council.
- l. Geoff: We didn't always agree at the onset, which was good having the different perspective.
- m. John: Helpful to talk about time commitments and responsibilities from Geoff and Alan, what have you done to date, how the process works, what it looks like moving forward, helpful for folks for people who are considering.
- n. Alan: Work with Program Officer would meet with Zach once a month or two for half a day, setting up agenda, discussing products progress and the mechanics of getting everything in place. Still do this with Bob typically once a month. Try to go to the TIE steering committee in South Lake Tahoe once a month, one of us tries to attend, Bob typically goes as well. Other meetings with governing board from CTC, they want a report of the issues the council is addressing and the work they're trying to develop, so those presentations occur on occasion. New set of meetings we attend because we decided to engage more directly with local executives, we are meeting with State Department of Conservation and Natural Resources, TRPA, California Resources Agency, staggered with regular TSAC meeting to discuss strategy, burdens, barriers, opportunities which are then brought to the council. Given that workload, it is at least a couple of days a month. Answering member emails, set-up work orders and programs. In the past, we have worked on the work orders and work plan and some of the early products and projects, so co-chairs invested lots of time to product a superior product and make sure it addressing the needs of that project, but that has changed because we have projects going now with adequate funding, new subcommittees, some of that burden is off.
- o. Geoff: In the last 6 months, there is a lot more funding. In the first couple of years, projects just getting by with minimal funding. In the next few years we are looking at having 2-3 times the amount of funding. Now some work is handled by subcommittees, so there is less work, but more oversight required of the chairs. It is exciting but requires time.
- p. Bob: As we have more and more resources we are moving to a model of Council members aren't doing all the work, they will be coordinating and identifying expertise within institutions. Providing linkages to broader science community, help achieve goals and products that funding is there for.
- q. Geoff: As Alan said, we aren't looking for a person now, think about it. Feel free to call or email Alan, Geoff, or Bob for more details. Consider it if you have the bandwidth.
- r. Steve: Do we have a formal mechanism for nomination and voting?
- s. Bob: Good question, something to think about. We will see what the interest level is. If we have a long list, would love to bring this back to the group for discussion. We will cross that bridge when we get to that.
- t. Jason: If you have no people stepping up, might be worthwhile to have a nomination process.

- u. Bob: It would be great to hear from interested people in the next month. Hope to have a list soon, earlier with regional management team for guidance and support. Like to advance the process by next meeting in January.
- v. Geoff: Let's think about how that would be done. In the unlikely event 3 people put their names in, is it popular vote, is it the regional management team, something to think about.
- w. Pat: I think votes would work, if there are three. Vote by proxy, weigh in.
- x. Geoff: If there are other issues to consider like state diversity.
- y. Jim: Something to consider and talk about moving forward.
- z. Alan: Anyone interested, contact Bob and let him know. In January, raise it again, for people who aren't here and extend opportunity to people who can consider whether they can serve in this position there are job and time constraints. Coming out of January we will have an idea of who is interested and maybe start making the decision by March.
- aa. Bob agrees and would like a decision by March.
- bb. Pat suggests we rearrange agenda so that the Upland and Science to Action planning gets switch around.
- cc. Geoff says the Task Status list has the funding, what you are referring to, is what we are budgeting for next year.
- dd. Pat says we are talking about funding needed associated developing plan for this year. There is funding component needed this year.
- ee. Alan agrees, change it to item 3c.
- ff. Bob thinks that this is the status of where we are in the work plan which will naturally lead to where we are going in the future with a variety of other things and how do we move forward.

3. Council Operations

(Bob/Alan/Geoff)

- a. Contract Status
 - i. Bob: Glad Jason is in the room, NDEP and TRPA contracts for evaluation of summer/winter clarity trends has moved forward very quickly. One of the tasks we are already late on, if there are members interested in participating, let co-chairs know asap, so we can start getting work orders in place and initiate that work. Contracts critical, moving forward from PSW, it continues to move forward in a halting process. PSW say they are ok we are doing a master agreement, that took a couple of years but they said yes. Dan Segen has been working with PSW staff. Don't have an agreement for USGS in Sacramento for Paul Work, we have one in Nevada covering Ramon, but that is moving forward as well.
- b. Responsibilities and Working Procedures
 - i. Bob: There hasn't been any written procedures or directive structure for how the council functions. We looked to the ocean science trust looked to this group for a variety of analogs, took that and started refining that. Have a draft of council working procedures. Would like to distribute to council and get some feedback, things that are missing or inconsistent.

Brought to regional management team, find what works best. Chair responsibilities, who does what, what member expectations are, and working processes with like the idea behind peer-review committee, the idea of subcommittees and how they function. Would like to submit this and solicit feedback. No great pressure or rush on this, if the co-chairs have thought on process? Maybe a month or two, pick this up in January if there is time and then figure out where to go with this document. New member orientation time document, idea of people who have not engaged how this works and where we are going.

- ii. Geoff: no major conflicts so we haven't had to go to the by-laws. Good to have it written down. By the next meeting, we have a final draft of procedures.
 - iii. Bob: Defers to members, wants all members to have time to review. 10 pages, relatively simple. Review date by January 5 to allow for time for edits. (ACTION)
 - iv. Alan: Not a legal formal document, it's an evolution of our new member's guide, expectations, it can change, we work out how to function and we have the latitude to adjust how we work successfully together.
 - v. Bob: We have had a recent conversation of how subcommittees form and function. Nothing is legally binding here.
- c. Task Status: Geoff and Pat will tack on one each, for a total of 9 tasks.
- i. Water Quality Threshold
 - 1. Alan: Objective describe data, so that we use same verbiage. When talking about outputs, described by... things like that. Designed framework for overall data structure. Some has been adapted by TRPA. Taking water quality and organizing, make science relevant to management objectives and reporting requirements. No new research, per se, but developing best methods/practices for engaging science to inform management... Dan Segal is working on this with Ramon and Alan. It's a 3-month project, finishing up in January. Already met and set-up what we are doing, how we are doing it, will meet a couple times next month. We will have a draft project for review in January, won't be long, but it will be useful for how this approach will work with existing water quality threshold standards.
 - 2. Bob: Working on the thresholds was one of the primary roles of the council, advancing that consistent with that. Will you bring products to the council and additional opportunity of what the group is preparing? Aligned with work plan and builds on council work.
 - 3. Alan: it is a shorter term project, anticipates having document to council before January meeting, and then finalize by late January early February. Product in relatively short order, come summer, we can point out something the council has finished. Early win for council.
 - ii. Periphyton peer review

1. Geoff: Last 30 years UC Davis has been conducting periphyton monitoring on behalf of TRPA and Lahontan, but recently primarily from Lahontan. Steve Sadro and Geoff created a short document of how things are done and now Lahontan wants an external review of the methods used, not sure of the actual scope, but certainly the methodology used. This is an external review where TSAC would organize the peer review, organized by Adrian's subcommittee, but would not be done by the council. Adrian sent out a request for references and a list presented by Sudeep. Sudeep organized a periphyton conference, Geoff was upset and alarmed in the conference, people were invited, but no one actively working upon periphyton at Lake Tahoe were either informed or invited. Not sure what they heard about Tahoe, but they heard something and Sudeep was represented for all things periphyton and now Sudeep is giving recommendations of people looking objectively at what is being done at Tahoe. Does not like. The workshop is done. Concern of people being recommended by Sudeep, because of this process and how they have been recommended.
2. Alan: Pls can suggest potential reviewers and names that they consider conflicted. So that is something we can consider, we don't have to, but the opportunity is there. We need to broaden list of applicants for peer-review. Has a list of names but they are all retired/emeritus and wasn't sure know if we are going in this direction. Not to say that someone from this past workshop wouldn't be included but to have a larger net to draw from would be useful and it is not to say that someone from Sudeep's list wouldn't be included, but would like to have a larger variety. Making sure the program officer gets in touch with members to get a list of name, maybe not.
3. Bob: Appreciates the concern, but everyone had an opportunity to provide a list. We weren't limiting we were trying to cast a broad net, but Sudeep was the only person who provided a long list of potential reviewers. We have a chance to engage with people and then see if there are conflicts with individuals. Not trying to limit the list in anyway, those were the only names provided.
4. Alan: I will provide a list, just wanted to know the type of candidates.
5. Geoff: there was no closing date for names. Alan described the Journal or NSF process, where the author can submit names of potential reviewers, the editor has the opportunity to submit names and it's a secret review. This intent is not to be a secret review, it is to be independent, but provide an opportunity for the reviewers to engage with the researchers.
6. Jim: is this something that can be identified, laid out and reviewed?

7. Bob: This is the first peer-review and the process has been laid out. Adrian has worked on the document.
8. Adrian: Has not worked on an engaged peer-review process before. There's a lot of vagaries there in the current process. In this particular case, I have reviewed things out of my expertise, completely reliant on getting names. Should have had a timeline. Something for the review document, how we ask for reviewers, and the opportunities we have to refuse reviewers. Ultimately, we are trying to get people, and probably get desperate. Update: took Sudeep's list of 6 people, looked at background, all faculty members or research scientists, emailed all as group, here's the review document, here's what we are thinking and here's how you will be funded. Heard back from two people and asked if they knew of more people. I'm in the positive of 2, now trying to gather documents for review. Everything is still open as to who the outside reviewers are.
9. Alan: Is it ok for the PI to be part of the selection of who is going to be on the review committee. As an engaged review, you work back and forth. See CV and see if they are going to have background, not that they have veto power, but can provide input.
10. Pat: Just like in Journal, who is this, why they are good candidates, no conflict of interest and qualified. Final selection should be on who oversees this process. Here are my recommendations and why I think they would be good reviewers.
11. Adrian: The more formal peer review, submit names of who should and should not review. It's worthwhile in this engaged review, it is fair to bring to PI to look at, because you don't want a personal conflict affecting the review process. Looks at their website and sees that they are writing papers related. Worthwhile to share with PI
12. Geoff: need to finalize list of names. Geoff might have some names, Steve has some names, John Melack and Alan as well.
13. Steve: Differentiate between agency representation and academics, a way for diversity.
14. Adrian: Not sure government agency members are able to account for time.
15. Bob: Encouraged to hear that there are more names, tapping into council members to tap into their networks. Encourages everyone to put forward some names and contribute to the process. This group has the context necessary. Folks working in lakes and periphyton, likes to think we could find a group. Adrian find a date to get names, does Geoff want to see the full list of name, or five names of people who express interest.
16. Adrian: Thinks to bring the list of people to PI to see if there is any conflict or objections and please formalize that. Take the document to council please provide names and reasons for recommendation, prioritize names, reach out to them, take those

interested back to PI, this is the plan going forward. I would have them in the wings and look to the next person on the list. Here's the next set of people to contact. Not a lot of internal conflict, but you never know.

17. Bob: Adrian requested documents compilation. Working with agency staff, pass by the PI, we are just excerpted things and provide info to reviewers in an effective way. Make sure docs are on.
18. Adrian: Wants names by the end of the day tomorrow. Want to start this and give things to folks over the holiday so we can pick back up again in January. Wrap up by early February. Should have been specific, needs names and emails now. Ok with by the end of the day Tuesday of next week.
19. Geoff: which documents will be provided?
20. Bob: has worked with Lahontan and TRPA to comile documents, wants to run it by Adrian to make sure it's consistent with everything necessary and then will provide to Geoff by next Tuesday. Literally 2-3 pages of materials, references there, but not a 150-page document.
21. Geoff: Having them review Lahontan contract? Periphyton reports? Data? Periphyton recommendation?
22. Bob: Not looking at data. Reviewing contract in terms of methodology and references for the methodology. Suggested changes that's a paragraph relevant to periphyton. How it was done historically, how it was proposed to be done, and the relevant references for those methods.
23. Geoff: what to add, is more recently, taken all the data in that report and brought to current time which is 4 years of data. When reviewing the methods, it is important to see what the data looks like. It's easy to come up with a methodology for system without seeing data, judging the weakness requires data.
24. Bob: Wants to defer to reviewers, if they would like to see the data as it relates to these things provided, you will be able to provide it and any context necessary. From an agency standpoint, these are the questions they have, the sampling locations, collection methods, and analytical procedures. I understand it's a broader question and that you want to engage, but don't want to provide with everything done as an initial review.
25. Adrian: What I've told the reviewers and budget, read 2-4 hours prior to meeting with PI then 4-5 writing synthesis of a report.
26. Geoff: Given the time constraint, provide data, seems like something up to them.
27. Adrian: Thinks that it is what the PI thinks the data is necessary than bring it up and it doesn't delay this.
28. Bob: Will share the document with Geoff and he can look over and see if more should be included as necessary.

iii. Summer/Winter Clarity

1. Geoff: In the last few years an apparent diverging trends of clarity in summer and winter. It has been of concern to everyone here and both states because of much what has been done addressed to clarity.
 2. Jason says 125 from NV and 50 from CA
 3. Geoff: Look at all data: flows, sediment, groundwater data, algal comp. dynamic of zooplankton, working with what's there. See if it can be better explained that how it is currently explained. Data analysis, 4-6 months long activity will be data crunching analysis and heated debate.
 4. Alan: This is on a tight timeline, want to have the findings available come may, closing loop on this by the end of May. Going into annual cycle, science findings from this date. Might be preliminary but there will be a product distributed to the execs and agencies.
 5. Jason says there is also a review built in and technical peer-review, thought this product needs to be out by state meeting, so this will push you back. Needs to be done by May.
 6. Alan: Review by May and final changes in June.
 7. Geoff: Soon as draft is done it goes out to pre-selected reviewer, the peer-review should already be set-up so that the draft can immediately be sent over. Equally important is that it is read for lots of people also at the summit.
 8. Jason: Basically end of the federal fiscal year, September 30.
 9. Alan: Who's engaged? Anyone with expertise and interest please let us know.
 10. Geoff: My role is on the side orchestrating, more people from Davis will be crunching data. Paul has data experiencing from USGS.
 11. Bob: Highlighting again, primary task highlighted in the work plan. Another good one to demonstrate some progress and results.
 12. Steve: Will engage but guarded about how much analyses to assist with. Not able to commit with analysis but will coordinate with Geoff and Alan together.
 13. Alan: Steve's input would be useful without having to do a lot of the base work.
 14. Steve: Has grad student who specializes with time series expertise who could assist.
- iv. Sustainable Recreation
1. Alan: This project has been moving along but not implemented due to contract issues. Finally, we have LTBMU sponsors to contract with TRPA, from this point on we can engage in this product. In progress. Timeline is to produce useful products related to tracking changes related to sustainable recreation for example user experience and accessibility. Management are more interested in access and experience, environmental impacts is on the list, but first they want a way to track accessibility, experience,

and use. In an initial qualitative experience environmental issues were on the priority.

2. Bob: This has been addressed by other venues.
3. Alan: Will work closely on TIE with
4. Pat: Who is working on this?
5. Alan: Contacted several people, Jose Sanchez from PSW, Elizabeth Covall from UNR, but some other people. Haven't talked to people in 6-8 months. Waiting for contracts to be in place. Related to framework for structuring data. Once they have the framework for sustainable rec, then we contact these people. After initial work with working group. Have not contacted anyone for the last couple of months because nothing has happened. TRPA wants products wrapped up by the end of next year. Framework, methods, and tracking methods by then.
6. Jim: largely driven by TRPA.
7. Alan: working with Devin Middlebrook and Jennifer Hebert from LTBMU.
8. Jim: Nevada struggles with this all the tie. Not really a quantitative project. Could project out and say this experience sucks.
9. Alan: Brought out a lot of work in anticipation. Lots of national level document for how to make this quantitative. Works with a lot of what we have developed for the Tahoe Basin is reflected at a national level in these documents which is very encouraging. It is just a matter in getting contracts in place, finally in place. Unless feds go on furlough. Once we have it in the TRPA then we will be in good shape.

v. Landscape scale impacts on Lake Tahoe (SNPLMA funded)

1. Geoff gives recap: Goal of this project is to look at the impacts of large-scale impacts on the Tahoe basin will have on the nearshore. Limited time and budget decided to focus on trying to understand current hydrologic transport of water is from the existing forests and how it gets to lake and where it goes into the lake. Assembled a team from USGS, DRI, UCD, and UNR, had productive meeting, how what we are doing links to Lake Tahoe West and on-going individual research in the basin. Current timeline is taking all input and promised in two weeks (early Dec), get a document back to group and then massaged with a scope of work and to match budget early January, and then run through PSW. See how long that contracting takes. We are producing a snapshot of the hydrology, water transport, data that doesn't currently exist to have a data point of what is realistic in one year.
2. Bob: Can you speak to the connection with the Tahoe West projects. Agency have concerns about how these funds were awarded and how they will be used, if we do Tahoe West scale projects, how will it impact the lake. Expand messaging, how can

we describe to agency members, how this is applicable and useful for understanding the impacts of management decision.

3. Geoff: My understanding, a lot of work of Tahoe West was heavily reliant on modeling. We are trying to find out if the assumptions made in these models are in the right ballpark. What wasn't addressed was what happens with that waters. From a burned forest etc, does water temp change because of less canopy cover, etc. Building lake and terrestrial models, once we have that, we have models for future conditions. How is that likely to change? Have some insight as to what will happen.
4. Bob: test model assumptions, where the water goes in the lake system.
5. Adrian: Piece of the hydrological model for Tahoe West. Ask model based questions, how will forest modeling affect water. Need model for prediction future. I would think of it as, this is a synergy between efforts of Tahoe West model-focused, bring to bear to monitor things. To be able to do this observations, pre-post thinning, important. Will want to readdress later.
6. Alan: Support what Adrian says. We use models like GS models by Tahoe WEST, looking to collect data to test these models. Real objective to take that data and drive prediction of what is happening to the lake.
7. Geoff: Maybe down the line, post-clearing conditions, you want to monitor, we will have some experience of what is cost effective. Do we need to monitor 1/week or 1/month just fine?
8. Alan: Implementing actual data collection.
9. Geoff: Everyone involved has done related work and is willing to purchase equipment etc. So there are funds being leveraged.
10. Pat asks about timeline? Are you sampling in 2020?
11. Geoff and Alan say ideally. It's tricky, because we might miss this winter, might be staggered.
12. Pat: Just as a first thought. Design team, technical team from science side. That design team is done, from March to June Tahoe West is wrapping up. There is a core team of the executives, this core team might be a good group to approach. Pat is on the team and meeting once a month. There is about 8 people. Sara Divatorio, coordinator and facilitator, most expeditious thing would be to contact her. Come back with recommendations. Lahontan, TRPA, etc. all involved with this group.
13. Geoff: Whole point of this, is the aquatic impacts. Potentially the TRPA person is forest-focused, but we need a water focus.
14. Bob: Will reach out to Sara and put her in contact with Geoff. Talked with CTC and, NDEP, Water board and see if there is... (ACTION) Provide connection and provide that agency has opportunity to engage.

vi. Clarity Model Enhancement

- vii. Lake Tahoe data synthesis and analysis
- d. Soliciting task interest

4. Lunch Break

5. Terrestrial, Forest Health and Wild Fire Subcommittee (Pat/Adrian)

- a. Pat: Asked by Bob to provide a presentation/overview from Lake Tahoe West. Most current point of context and then get into what that might mean and other sources to queries to identify needs to inform a science to action plan. Lake Tahoe West has been in progress since 2017, at least a dozen PIs working on this project. Institution in CA, NV, and ID. Johnathon Long and Pat are co-leads. A whole management team, stakeholder team, and structure around this project. We will only talk about what the science team is doing. Now moving into the phase of designing projects for Lake Tahoe. Did an assessment, typical of a large landscape project, status of all resources, what do we care about and what are concerned about, and then design/management approaches. Sub-conditions to move to a desired set of conditions. Broaden temporal component, the assessment done by land managers was exclusively vegetation, because that's what they had that was temporally explicit. Landscape resilience assessment, all vegetation variables from LiDar data. Brought in temporal component, trans-disciplinary evaluation to look at how these resources will change over time, given climate and different management approaches. Strategies management might want to adopt and why. Used Landis 2 models: forest growth, beetle dynamics, and fire dynamics, how they were expected to behave over time, a 100-year timeframe. Two different climate pathways, 2.5 and 8.5. For each of those, picked one climate centric model and in the other we picked 4 to give more breadth of the effects of the model itself. Came up with 5 different management scenarios: 1) no management put out every fire you see. 2) proximity to the built environment (defense-threat zone within 1.5 mile of a built environment), Fire Suppression, WUI-focused thinning (1000 acres/year), landscape-wide mechanical thinning, landscape-wide prescribed fire, and twice as much fire as 4 same amount of treatment as 3. 3) focused on mechanical treatments, 4000 acres. 4) 2000 acres/year primarily fire was the tool. 5) same acreage as 3, but with fire as the primary tool rather than the mechanical tool. 3 and ramped up 4 are similar. 60,000 acres in Tahoe West turned about a 30-40 year disturbance return interval. Its been that long since disturbed or how long it takes for the trees to go back. Different treatments, thinning, mechanical and hand. 8.5 is our current trajectory.
- b. Pat: Moving into results, modeled suite of resources, disturbance dynamics, vegetation, wildlife habitat, water quality, water quantity, smoke emissions, air quality, and a variety of economic metrics included expect number of homes lot to fire. Just going to touch on some of these, as an overview. Seral Stage, broken to mid, late, and early to match with classification from managers. The 5 scenarios modeled, the darker is later. Under any scenario, a climate of 4.5 pathway, old forests fill in, because of the relative effectiveness of reducing areas

of high intensity fires, a function of the proportion of landscape being affected by a desirable or undesirable disturbance is fairly nominal. A lot of forest, 80% of forests are in mature condition. Most move into a mature. Right there, suppression for 100 years, right on the cusp moving into old forest condition. Fire kills trees, not all low intensity.

- c. Geoff: Are they all about the same 40-44%?
- d. Pat: 10 replicates, take the average and depending on what resource you're representing, for some of these, you can see how variable they are, which tells you how stable or how unstable they are. Over time it averages out, but in any one run it can be very variable.
- e. Alan:
- f. Pat: One hectare scale, the values are calculated has a tree list that has number of trees by species and cohorts. Age interval is like 10 years potentially. How many trees per acre, species composition change, canopy density based on.. Hug lup of everything over 24 inches in diameter, then falls into the late category.
- g. Jason: design team is using..
- h. Pat: Not directly, understands how much needs to be treated over time. Shooting for 400, meets some management goal, feel good about that They went with what they could do. Some groups say they only use fire, but not going to happen. Most restrictive over 40 acres, not meeting threshold. Based on historical info from basin and sierra Nevada and outside of the basin. What is acceptable, not acceptable? Not only is it increasing, but it's slope is also increasing. With WUI only, rate of accumulation is less severe. Getting into 400 year it really ramps down and the slope is greatly reduced. Track numbers of acres treated. Whether it mechanical or fire, it doesn't change significantly. The pathway for climate even for the more extreme, don't have the greater effect as management does.
- i. Jim: Looking at 30% slopes, increase pace and scale, a lot of discussion, the pace and scale hasn't been limited by planning or funding effort, but by crew availability, seasonality, etc. Did you monitor these scenarios where we might only be able to do 2000 acres.
- j. Pat: that is what is being modeled, essentially v4
- k. Geoff: asks questions
- l. Pat: reducing down, ...basal area. What you're taking out.. it depends what you're taking out.
- m. Geoff: 5-6 more dense than pre-discovery, is that what the aim is for?

- n. Pat: Removing the case in the basin, maybe not in the basin because of high elevation, maybe 3-4 times. Basal areas in the... take that down to 80 or 100. The one take home is that management can make a difference, the second is, how much should you treat? By treating this 400/year, this 30-40 return interval makes a big difference and you might not have any high intensity patches that could be reduced even further by even more management. Difference between thinning and fire, not substantially different.
- o. Pat: Cumulative emission of fine particulates from smoke. Intentionally lighting fires, generating smoke, definitely smokier. How does that translate to environmental and health impacts? They do flip in terms of emission of wildfire being far more impactful, economically and socially when compared to prescribed fire.
- p. Pat: Total Carbon with moderate climate change – over 200 acres, same scenarios, quite a different impact in terms of carbon sequestration. More aggressive was the lesser amounts of scenario 5. Potentially show EMDS after Adrian to look at tradeoffs.
- q. Adrian: Give a little case study builds into the science to action (S2A) frame that as, question that seems so fundamental to mgmt., how flammable the landscape is, where does the water go? Our science tools are nascent; mgmt. needs are increasing. Tahoe receives so much precipitation, where it falls to the ground is critical. A colleague Patrick Broxton at U of Arizona, closes mass and energy budget at a 1-meter scale. Both scale that effects process and makes management decision from thinning view. Results you get with model like this, remove trees. Ran two scenarios, removing trees shorter than 20 meters, runs model that passes and builds snow packs, take forest out, reduce canopy, so you see more snow falling to the ground. Take this model to distill for mgmt. decisions for the west shore. North facing and south facing aspects, yellow area shows the greater density of water, based on height of canopy. Scale this up in some ways to show all the watersheds in the west shore to show where to focus resources. Recommendations made to mgmt. community and work on cutting edge of hydrology that provide direct benefits to improved mgmt. decision. It is often difficult to not do this effort in a box, a lot of challenges that you face thinking about robust are these in terms of climate change, how robust are these model and can we verify. What are the broader effects on the hydrology and the lake? How do managers take this info on the effort?
- r. Pat: Total particulates in terms of emission, related to everything else and then withing emissions, days with high to extreme, which one is worst are they both problematic? Decision framework for sustainable rec and upper Truckee, these are the kind of things to bring into the system to prioritize them. Looked at smoke impact for how severe is severe. Geographic and temporal component. Economics, calculate average treatment cost, if you did a bunch of treatments on the ground, occurring by loss of treatment. Look at actual costs and it didn't really play out in terms of savings. Some of these costs that dropped out is the risk of property lost. Cost of treatment increases. Human and financial cost. Some of

the complexity we tried to explore. 5 million for the mechanical treatment seems reasonable.

- s. Jim says its calling 20_+ million, take into account the entire basin.
- t. Pat says prescribed burning is not cheaper than thinning.
- u. Alan: managers say they won't get this funding, but it's studies like this...
- v. Geoff: with Mechanical treatment you have some commercial to offset
- w. Pat: not a lot of opportunity needs a better demand for biomass
- x. Pat: showed species richness, multiple functional groups, functional diversity, feed into wildlife conservation. All the grey noxes were actually monitored and feeds into logic model, that feed into proposition as to whether or not we have achieved wildlife conservation goals. All fed through logic model, very explicitly how well we are evaluated and meeting this goal. This is how you measure how well it's performing. Have a logic model for vegetation, Function fire, WUI fire, quality of air, recreation, and cultural resource quality.
- y. Pat: Proposal is that we want to build a plan
- z. Adrian: An opportunity frontline of climate, fire, and water change, efforts and resources going into Tahoe West, this is cutting edge. Not many groups trying to co-manage all these things. Building on LTR act and the possibility of funding this in the future. Justification, we will better prioritize investments and... Upland system both terrestrial and aquatic, nested or linked ecosystem, conversion of forest land cover via ground water and snowmelt, feeding streams and lakes and ultimately Lake Tahoe. List of why people would be interested in protecting upland area, fire being number one.
- aa. Pat: 4 main emphasis areas that the plan focuses on data and tool aps, interaction and dynamics among these, water balance and meadow ecosystem and resilience, how it is effected by different management conditions. Outreach and education and greater access to data. Demos of watershed or greater interface in real life to interaction in science and research activities. In addition to Lake Tahoe West, which we can mine and use as a foundation, for understanding why there are gaps and how they matter. Touch on this, 20-year anniversary of watershed assessment, hadn't been done to this degree, this was across a while array with a socio economic view etc. Integrated science plan in 2010 and all of the outcomes of big investment of SNPLMA funding, completed in 2016, at least a decent chunk. Take a retrospective, how far have we come, what have we addressed, and what have not addressed, and what are some issues that have popped up. All the greater details are in the document.
- bb. Pat: Steps to developing the Upland Ecosystem S2A plan by August 2020.

- i. Staff for support development
 - ii. Draft (March 2020)
 - iii. Review by stakeholders
 - iv. Review of updated by TSAC and peer review
 - v. Final document at the latest July to be really to roll out by the summit
 - vi. Staffing budget needs \$50k
- cc. Alan thinks the staffing budget needs, tackles the retrospective and the need of the project.
- dd. Yes, Pat thinks that the retrospective is 90% of the work.
- ee. Alan thinks it would be good to add a step, because of the Lake S2A we went thru several iterations, add another round of edits from TSAC.
- ff. Geoff: what we learned was that a report that only the subcommittee had had the opportunity to look at but the rest of TSAC didn't have a chance for buy in.
- gg. Pat: we have a lot to work with because of Lake Tahoe West
- hh. Bob: would be good to id key agency staff to engage with and so that moving forward everyone likes the direction heading. Part of the problem was finding that unity and agreement, and making sure the whole community as a whole agrees.
- ii. Pat: Upland focus plan, less than a year, something by the summit. Integrated science plan took a long time. Has all research background, management. questions, lots of iterations had been done, but we don't have time for that. Should scope project to be realistic but it should be a product. I expect, the product won't be hugely substantive. Not lose sight of what Josh said, do we want co-develop that and bring up everything of a specific level specificity, multiple pieces,, bring together, then bring the managers, does not want to focus as much with manager questions.
- jj. Alan: Do what you can do? We did the Lake S2A last year, Upland s@A this year. Bring in some other elements later. ID key themes, rest sits there, and I'm sure we will be coming back to these and then we have the opportunity to link them back. Pick out key elements that we will then want to address in the next year. Taken some time to take stock, where to invest funds in the next year, short term investment to get things going. What function are we going to play in providing this broad foundation to speak to the LTRA and hat investments that could meet and what product does it look like? Here's the funding source, timing, invest x amount of dollars, complete what has been identified as high priority. Agree scoping with what can be done realistically this year.

- kk. Alan: Says yes, time element to this program itself. Identify things that we want to highlight for available funding streams. Set the stage for the bigger picture.
- ll. Bob: striking that balance is critical. What we hear about what are the needs and how can we help invest in those. The dollar figures start very high, this is the body to do it. How can we provide that degree of balance, first priorities that need to be done, direction that starts moving us in a direction to achieving these bigger goals? Want to see that link back. That we are linking back. Here are immediate needs and goals of where we are going. Bob doesn't want to set a timeline that we complete by August, figure out funding needs, what is the dollar figure to do this in a way that provides opportunity for stakeholder time.
- mm. Geoff: For example, we wouldn't be able to get a contract in place by the draft due date.
- nn. Pat: There are projects that absolutely fall into each category. We could have these conversations around those. Would take staff longer to do the synthesis. These documents exist.
- oo. Alan: set up framework and plug in pieces when ready and available, but doesn't have to be held to this timeline. Adrian and I don't want to wait a whole year before.
- pp. Adrian: building on this point, there is time sensitivity. There's a 1-3 year time frame when Tahoe West when all this research is going from. There's public perspective. Future restoration from what we learn from this investment.
- qq. Jim: Appreciate the slide, historic look back to... when I advocate for science there is a perception that is unfair that is a new study, what happen to the old study, to be able to tie that and show the timeline how this is utilized and identify gaps, need to do more of this. Talking internally, a desire to have a broader s2a plan that looks at basin holistically. What are the science needs, correlating policy? Having this document and marry s2a to have one document, then it might be holistic. 3) time is right, lot of conversations with Patrick about CAP Climate adaptation plan, an adaption plan technically, it is largely a compilation of what has happened, take that effort more of a basin-wide effort. Timing is right.
- rr. Geoff: Building on inventory of action, a plan eventually has to prioritize them, with this level of funding we should do these two first. We as the experts should say due to time and resources this is the order. One of the conclusions we came to early one, climate is a major drive. Maybe forests may not be a clear cut.
- ss. Pat: what can we do that spreads the benefit...
- tt. Alan: This year terrestrial, last year lake, then next year holistically
- uu. Adrian: Agrees, needs its own plan

- vv. Bob: How is TSAC engaging on climate and role on climate conversation? A natural link. Discussed with Geoff as climate a driver on a lot of these. A more united front or clear direction and inform management. Next steps? Find money?
- ww. Alan: tyes, that is key
- xx. Bob: look for opportunity for funding, look at values and see where we are. Consistent with council function, support how advancing this conversation. Timeline for doing this, then put contract in place and start issuing work orders. Happy to look at values now to see if we have the resources to get it to move forward.
- yy. Alan: Get that contract with PSW ready to go, then when funding comes in, smooth transition.
- zz. Pat: UNR and DRI might be who needs funding asap. PSW might not require the funding, can still keep moving forward.
- aaa. Bob: wants targeted agency feedback. Who are the agency touchstones find alignment there and will be helpful moving forward. CTC would be part of that. There's a nice way of joining efforts with California and Nevada. Not sure if it helps or hurts to have TRPA about.
- bbb. Jim: we are all on solid footing, with TRPA, regional plan updating, to have this larger effort, wants TRPA involved but also wants document to support...
- ccc. Alan: Had Mike Dettinger with subcommittee for Lake S2A, if there is someone that would be sueful, let Bob know, there might not be. Do you have an idea of the cost of the Lake Tahoe West, the science. I think it was a lot, we are used to doing things on the cheap, it is time to be realistic about creating quality projects
- ddd. Pat: over a million, facilitated new LiDar with JPL.
- eee. Geoff: Pat and Adrian are you happy with the presentation.
- fff. Adira: there is a lot of detail and we appreciate feedback
- ggg. Pat: But keep it fluid to keep things moving along. After this date we will have to roll into the next iteration. It would be really helpful
6. Discussion on external projects requests to the Council (Bob/Geoff)
7. Wrap up, next meeting date/time and agenda items (Geoff)
- a. Bob: Meeting dates, not eager to revisit rescheduling and will return to the conversation via email to find the appropriate meeting date.

- b. Alan: Next meeting is scheduled from January 16th 3rd Thursday, of January.
- c. Bob: Will continue to engage on the discussion and will send out outlook placeholders. Take some time next week or early in December to confirm schedule. Stick to January date, but will wait to see on the other dates. Biggest hurdle this group has taken over. What are the documents, etc... trying to push forward, if there is something for the council to engage on, as folks become more and more aware, wants to make sure it is productive.
- d.