Responses to the Workshop Panel Questions

Preamble: This reviewer came away from the workshop with an extremely positive impression about the Upper Truckee River Restoration Strategy process. The draft Strategy itself is thoughtful and well-written, and the workshop participants in all roles were well-informed, professional, and passionate about a common goal. Special thanks to Patrick and the CTC staff for the wonderful job they did in hosting the event.

1. The current Upper Truckee River (UTR) strategy and philosophy focuses the design of projects on the restoration of geomorphic and ecosystem functions. In what ways is this approach likely to be effective or ineffective, as a whole, in achieving the projected benefits?

The framework, broadly, seems well thought out and comprehensive, with respect to planning, monitoring, and evaluation, especially given that this is an early draft that will be revisited and modified as a result of comments. This specific question is out of my area of expertise, but I would ask whether the full range of scientific expertise that is appropriate to this question was consulted in the drafting of the Strategy. The draft leans heavily toward a geomorphological approach and, while this may be fully appropriate, the question I have is whether this reflects the preponderance of expertise among the staffs writing the draft, or is a result of a wide, inclusive effort to attract scientific opinion about restoration strategies. Certainly the staffs of the agencies are fully committed and very capable, but does their collective expertise, and their scientific contacts, cover that full range? If not, there is a risk that the perspective about what is most important to emphasize in building in resiliency to climate change while seeking to achieve the types of benefits listed is skewed.

On the positive side, the emphasis on restoring functions, as opposed to designing projects around the benefits themselves, seems sensible and appropriate to this reviewer. From my limited perspective, it does sound right to build in capacity to respond to changing environmental conditions through creating as healthy and well-functioning systems as possible given today's conditions.

Overall effects of the program may be hard to evaluate in practice as there are many ongoing and potentially rapid changes occurring, especially those relating to climate change. These not only confound the isolation and identification of program effects, but also likely change the desired end targets of restoration in ways that are not necessarily readily predictable.

2. How could the overall restoration strategy be improved to provide the most robust, comprehensive, coordinated, and coherent framework for restoring ecosystem function and resiliency within the UTR stream channel and floodplain?

This again is a question that my expertise does not offer much insight on. There are a couple of practical areas which should be considered carefully in terms of the on-the-ground functioning of the framework. One of these is in monitoring, which the Panel has had fairly extensive comments on, and another is interagency cooperation. From what we saw, this seems to be working well at the technical staff level. (This is really the only level of interagency interaction

that we got a look at.) To the extent that it is not also working well at the higher levels of agencies, this is an essential issue to come to grips with.

3. The UTR restoration effort involves a wide range of varying landscapes, impairments, constraints, and opportunities. Considering the significant variations in individual project reaches and the potentially different restoration concepts used in specific settings, what additional guidance can the inter-agency strategy incorporate to ensure that the most efficient and beneficial river-wide effort is implemented?

This question gets to the fundamental issue of setting priorities. While it is evident that the staffs that created the Strategy have a pretty clear set of priorities guiding their thinking about restoration strategy, it is less evident that these have been written down and communicated to those outside the process in a sufficiently transparent and detailed way. Doing so requires stepping outside the immediate list of unfunded projects in the draft Strategy, which for a variety of specific reasons seem to have a reasonably well-agreed priority order to them. It also would seem to convey several important benefits to the process.

First, Lake Tahoe is a unique national treasure, and the UTR is the most important watershed draining into it. The management framework used here can and should be a model for stream restoration efforts in California and around the country. Second, it should demonstrate how the analysts are thinking about and incorporating ecosystem service values into their priority-setting process. There are at least three fundamental reasons why this is important. First, the ecosystem services yielded are the most tangible connections the broad public has with projects undertaken in the UTR. Second, ecosystem services are hugely important in today's world, because a failure to adequately consider the effects of our actions on them can have significant negative consequences. Optimization of these services to society over time *should* be the goal of restoration efforts. Third, outlining how the management actions undertaken result in anticipated improvements in ecosystem services will enhance the public's appreciation of the job that the responsible agencies are doing. This is extremely important, in that the projects are undertaken on behalf of the public, using the public's money, and the public's support is critical to continued success of the management effort.

The setting of priorities operates at several levels, in similar ways. At the project level, it results in the selection of a preferred alternative. At the stream reach within the UTR, it results in a priority order for projects to be undertaken. Within the Lake Tahoe basin, it is implicit in the ways that moneys are spent across different geographic areas and pollutant sources. It is this reviewer's opinion that (a) the goal of these optimization processes should be to maximize the environmental services the Lake provides to society, among which it seems there is general agreement that the overriding, but note sole, service is lake clarity; (b) that to do this, explicit tradeoffs between the environmental services that projects offer must be and are, as a matter of practice, made; and (c) these should be quantified and widely shared with those on whose behalf the decisions are being made.

This is potentially a formidable task, as the area of ecosystem services values is a deep and complex subject in general. This difficulty is reflected in the current draft Strategy, which does not explain how they are going to be incorporated into planning. While the discussions of ecosystem services in Section 2 is sensible (if brief), the management strategy (Goals,

Objectives, and Approach) in Section 4 says only that "UTR projects plan to address" them (p. 31).

However, there are accessible, intuitive, and rigorous ways to recognize the important ecosystem services concept in decisions that are currently being made by staffs of all the agencies that trade off the *relative* values of ecosystem services. As an example, one fairly simple and inexpensive-to-adopt way to make this more explicit might be a scorecard approach. This can readily communicate and quantify the ways in which the staffs' deep knowledge and experience are now being used to decide (1) what alternatives are chosen within a project, and (2) which projects within a basin should be chosen first when funding becomes available. It could operate at the level of (a) staff experts' choices only; or (b) a combination of the staffs' and the public's assessments. Taking (1)(a) as an example, with UTRWAG as the forum for argument's sake, each participating scientist could be given a scorecard with 100 points and be asked to assign the 100 points among projects based on the measurable project outputs (e.g., willow density, substrate, and fish counts, to name just 3 among many as a simple example) that ultimately lead to improvements in environmental services provided (water quality, vegetation, animal and fish population levels and quality, etc.).

The first step for each scientist in doing this scoring exercise is to decide what each type of project output is worth on the 100 point scale. Each scientist's allocation of the 100 points reflects their own relative valuation of the project outputs as they are understood to enhance ecosystem services.

Since project alternatives provide multiple outputs, an individual scientist's score for any individual alternative would be the sum of the quantitative changes in outputs provided by the alternative (which are agreed upon by all) times the weight s/he assigns, summed across all outputs for that alternative. Presuming that the relative values of each scientist participating in the process were weighted equally (which seems especially appropriate for processes such as UTRWAG), the group judgment about each project is the sum across scientists of their scores for each alternative, and the preferred one is the one with the highest score.

A couple of important points should be noted. First, a scoring method could be too simple in some situations, and it might be appropriate to explore such a methodology on an experimental, advisory basis. Second, a method such as this could readily be expanded to include the preferences of the public over alternatives being considered, which could have several side benefits, namely (a) increasing their sense of empowerment and involvement in decisions involving <u>their</u> resources; and (b) better informing the staffs of what the public really does want, which is an important part of their missions and can help shape the definition of alternatives. Were the public's opinion included, it would likely be appropriate to weight their average score lower than those of the scientists involved where the alternatives involve technical/scientific issues for which the staffs are better trained.

It appears that this is the area for which existing staff expertise is least well suited, notwithstanding the dedicated efforts currently being provided. To ensure the proper consideration of ecosystem services provided by projects undertaken under the Strategy, which is critical, it seems likely that additional staff with appropriate disciplinary expertise will need to be added.

4. Does the monitoring, analysis and reporting as described in the UTR strategy document, adequately provide guidance for measuring success in achieving the stated goals and objectives? In what ways can the monitoring, analysis and reporting be improved?

This is an example of an issue that arose in several places, where the words on paper are mostly well-written and seemingly well thought out (though often incomplete), but it is hard to tell how they translate to actual practice. Results on the ground may not have in the past met, nor in the future, meet the ideals set out in the Stategy. One obvious problem in evaluating this is that several criteria mentioned for measuring success on page 33, including cost-effectiveness, relative cost, and established protocols, are either not explained or not meaningful.

Cost-effectiveness measures the cost per unit of (valuable) output obtained, and to implement it one needs a measure of what the value obtained from the project is. This links to the general absence of guidance on how prioritization is implemented that was discussed in the response to question 3. It's not easy, but is vital to think about how one ranks and "values" the outputs from stream restoration (and other) projects: how important is a water quantity regulation function relative to water quality, habitat, terrestrial wildlife, aquatic life, human use and enjoyment, and other valued outputs from the projects? You need to state what the objective functions and process guiding the choices actually made is.

I'm not sure what the relative cost criterion referenced on page 33 is, beyond the obvious comparison of price tags, which, if meaning nothing more, is subsumed by the cost-effectiveness criterion. Its inclusion suggests it was either a throw-away bullet point or there was no time to develop a narrative about it. And I have no idea what the "established protocols" criterion in the same list means.

5. Ecosystem resiliency is an overarching restoration goal. How do we more effectively communicate to the public and local government representatives the technical processes undertaken to select project approaches to achieve this goal, such as balancing risk of potential short term construction related impacts of restoration projects with the long term benefits to ecosystem function and resiliency?

This seems very challenging given my impression of the long, and probably often negative, interactions that some, perhaps many, Basin landowners have had with regulatory authorities. This reviewer much appreciated the information provided by staff and the public about the fairly extensive existing outreach activities. It sounds like there have been a number of notable successes, as well as some areas in which participation has not been as extensive as desired.

I think the goal of existing outreach efforts is to enlist the public's support and goodwill on behalf of the restoration and other environmental improvement goals, and I think that emphasis is right and appropriate. But there are probably some opportunities, both in connecting the public more closely to the science involved in management and regulatory decisions, and in enlisting their goodwill.

The idea of enlisting members of the public as science assistants came up in the workshop. In principle, a public that is engaged with the science of protecting things valuable to them can act as important advocates for the scientific activities, and empower them with the sense they are really contributing to the material improvement of their own "back yard." This is, no doubt, a long-term process, but one that costs little compared to most of the hard science projects. Pilot science projects, perhaps beginning with schools from K-12 to university, that enlist their time in a fun experience that is part learning about the whys of what's being done and part collecting data can, depending on the ages and skills of those involved, deliver differing results on the spectrum from mostly educational to mostly enlisting cheap labor for science. It

appears that this is already being done, but there may be a substantial reservoir of science assistants in the older grade levels, say from high school through college, that could be engaged further.

Another way to open up the science to the public would be to open to everyone the technical meetings that are now closed. There was evidence in the comments that the public feels excluded and patronized within the process, and steps like this might show a willingness to be more inclusive. This would have to be done under conditions that don't hamper the productivity of meetings (e.g., no public comments, some parts of some meetings necessarily remaining closed). It would be straightforward in principle to live stream and post on the web the technical meetings as an alternative to actual public attendance. This also would have the advantage of opening the science process to a much wider swath of the public which uses and values Lake Tahoe, i..e, recreational visitors and non-visitors with an interest in the Lake's clarity.

In the area of outreach, there are things that may not have been tried and could have significant payoffs. There may not be immediately obvious funding, but it may be that they can be creatively bundled with scientific missions, and which seem likely to have high incremental payoffs. These include, in no particular order:

-beef up school engagement efforts, especially at the junior high and high school level, with an eye on both both educational and data collection missions. One can easily imagine a spectrum of interactions that classes from various grade levels can have with the UTR, ranging from mostly educational in the lower grade levels to some combination of education and science assistant at the upper grade levels. (Data collected by less trained observers can, of course, be incorporated into research efforts by taking care to identify the data collected by interviewer.)

-devote immediate attention to disseminating data even more broadly and deeply than is already done, so the public, when it looks, will feel empowered, not rejected, by Lake Tahoe scientific efforts.

- investigate the effectiveness of current outreach efforts. The panel heard comments that suggest that the agencies' perceptions of their openness to public involvement do not match the public's. This type of effort can involve public opinion surveys, web surveys, focus groups, or "on the street" random intercepts, depending on the objective, resources available, and type of use to which the resulting data are to be put. A number of these can be done in-house.

- in the interest of fostering the public's perception of openness on the part of agencies, look seriously at opening every meeting on project development to the public, with ground rules that allow them to gain a better look at the process without seriously compromising productivity.

-spend some effort cultivating support from wealthy Basin property owners, by hiring/training development officers/fundraisers to pursue their support, financially and otherwise.

- use social media to tap into the statewide, national, and international appeal of Lake Tahoe's special (and fragile) environmental appeal, monetarily as well as opinion-wise.

6. How should new scientific information and technical advice that is obtained as part of program or project development be incorporated to improve and expand the river-wide restoration strategy?

From my perspective, probably the most important dimensions here are the activities that occur after a project is completed: (a) ensuring that monitoring and evaluations continue *after* the capital phases of projects conclude; (b) ensuring sufficient effort is put into the modeling and data evaluation aspects of project evaluations; and (c) establishing a record of both qualitative and quantitative data that is consistent over time and passed on to subsequent research teams. This reviewer and the Panel as a whole recognize that in the current budgetary environment, it is difficult to find funding for of *ex post* monitoring. That does not diminish its essential importance. As for modeling and data evaluation, I cannot tell whether the existing staff capacity accommodates this adequately at present or not; if it doesn't, more staff must be hired, to put it simply. Item (c), establishing a qualitative and quantitative archive of observations, can be implemented with existing resources.