UPPER TRUCKEE RIVER RESTORATION WORKSHOP

RESPONSE TO PANEL QUESTIONS

1. **The current 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?**
    a. Effective - The current UTR strategy and philosophy of focusing the design on restoration of the geomorphic and ecosystem functions has a high probability of being effect for several reasons. The ultimate goal of the UTR restoration is to "…bring it (UTR) back to its pre-degradation state or nudge it to a new state of equilibrium" (p.25). The state of equilibrium is determined by the current geologic, hydrologic, geomorphic, climatic and biologic components. Biological equilibrium requires the necessary hydrologic and geomorphic conditions operating in the current geologic time scale (not accelerated). The hydrologic and geomorphic processes form the basis of a solid restoration plan that will (if properly enacted and monitored) provide the foundation for the bio-geophysical processes necessary for ecosystem recovery.
    b. Effective - Focusing the restoration effort on the geomorphic and ecosystem functions forms the foundation for a solid restoration project. Restoration of biological resources (flora and fauna) first requires successful restoration of the geomorphic component in order to be successful. Current vegetative conditions on the UTR floodplain are less then optimal due to degradation of channel morphology (down-cutting/incision, over capacity, and loss of sinuosity). Down-cutting has lowered the streambed elevation. This has resulted in a loss of floodplain interaction, and a lowering of ground water levels across the floodplain. Raising the streambed elevation and providing floodplain access will provide the hydrologic conditions necessary for biological restoration (flora and fauna).
    c. Ineffective – The strategy lacks prioritization. Without priorities then every component of the restoration of each reach is a priority. If everything is a priority then nothing is a priority.
    d. Ineffective – The strategy has a stated philosophy: "…focused on re-establishing natural geomorphic processes and functions" (p.25). This philosophy is unattainable due the immovable structures on the landscape that prevent natural geomorphic processes and functions. Specifically, any road, runway, berm, fill, structure, etc, on the landscape will interfere with natural geomorphic processes and functions. The fill on the Highway 50 bridge across the UTR has taken away the floodplain and forced the river to flow through a dedicated

location. The LTA intrudes into the floodplain and restricts the channel to a narrow corridor with limited floodplain access. Both impede the "natural geomorphic process and function."

e. Ineffective - The approach may be ineffective due to the limited amount of floodplain area available for restoration, and lack of project funding. The LTCG and Lake Tahoe Airport (LTA) reaches have limited amounts of floodplain area available for restoration. This will limit the effectiveness of these reaches to trap and attenuate fine sediments, provide storage for flood waters, provide habitat for obligate species, and mitigate for climate change. Additionally, the lack of floodplain benefits in these reaches puts more stress on downstream reaches in terms of both erosion potential and fine sediment trapping.

f. Ineffective – the UTR Strategy acknowledges the impacts due to climate change, both current and potential. The Strategy describes the anticipated changes due to climate change, specifically mentioning an increase in the amount of rain, and more rain-on-snow events. The Strategy's approach to mitigation for these anticipated changes are to provide more floodplain interaction. However, Goal 1 of the Restoration Strategy states: "Restore properly functioning geomorphic channel configuration." Objective 1d of this Goal states: "Eliminate or reduce the need for maintenance by designing a geomorphically stable channel; note that stability in this sense is a dynamic equilibrium; the channel is not intended to be perfectly stable in one location over time, however, change should not be catastrophic, but rather characterized by slow movement of meanders over time, with erosion and depositional processes in balance" (p.26). I believe this objective is unrealistic and probably unattainable, for the following reasons.

    i. I don't think it is possible to mitigate for all the potential/anticipated impacts due to climate change specifically because the anticipated impacts are more rain-on-snow events and the Strategy specifically mentions that "Although infrequent, large floods occur as a result of rain-on-snow events. These floods can be much larger—often several times the volume of a typical snowmelt flood. **Large floods can have significant geomorphic effects**" (p.11).

    ii. If climate change is expected to produce more rain-on-snow events, and rain-on-snow events cause large floods, and large floods can produce significant geomorphic change; then designing a "geomorphically stable channel" where "change should not be catastrophic, but rather characterized by slow movement of meanders over time, with erosion and depositional processes in balance" are diametrically opposing views.

    iii. It would seem more appropriate to:

1. acknowledge the potential impacts from climate change,
2. state that more rain-on snow events are expected, and the restoration design will seek to obtain a dynamic equilibrium but,
3. catastrophic rain-on-snow runoff events, expected due to climate change, could alter the channel morphology of the UTR.

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?

a. The management framework centers around meeting Threshold Standards for WQ, soil conservation, vegetation, etc. The Standards are set by TRPA and enforced by the Lahontan RWQCB. So one agency sets the limits and another agency enforces the limits. Communication and coordination between the two agencies will be important for the strategy framework.

b. There are fourteen (14) entities that have some form of involvement in the restoration of the UTR through ownership, jurisdiction, funding, etc. All parties must remain engaged in the process, even after completion of their task. Agencies will need to allot staff time to attend meetings and participate in the process well beyond the completion of their individual task(s). Continued, dedicated involvement from ALL entities will keep the process moving forward and allow for a robust, comprehensive, coordinated, and coherent framework. And that will allow for the process to attain resilient ecosystem functionality.

c. The Threshold Standards identified a targeted reduction in the amount of erosion from streambanks and channel bottoms in the UTR of 50 percent. Erosion from these sources currently accounts for 4 percent of all sediment eroding from the UTR, but comprises 60 percent of the fine sediment in Lake Tahoe from these sources.

   i. Is a 50 percent reduction in the erosion of streambanks and channel bottoms feasible? If attained, will this reduction allow for natural geomorphic process and functions (i.e.: channel migration, erosion/deposition processes)? If not, then this is an indefinite loop and you will be chasing your tails trying to achieve something that is infeasible.

d. Access to more floodplain area in the LTGC and LTA reaches. These two reaches represent a significant amount of floodplain area on the UTR. The inability to gain access to the floodplain in these reaches possess several problems.

   i. Both reaches experienced high fill volumes during construction of the airport and golf course. The fill was compacted during construction of

these facilities reducing the sites ability to infiltrate water into the soil and recharge groundwater.

ii. Flood flows will remain confined in the UTR compared to other restored reaches. This will result in higher in-stream velocities as flood stage increases. Reaches with floodplain access will experience a decrease in the in-stream velocities as flood stage increases.

iii. As in-stream velocity increases so too does the stream's erosive power (shear stress). The LTGC and LTA reaches have been identified as primary sources for fine sediments from the UTR. Increasing erosive power may result in more of these fine sediments being eroded.

iv. The increased erosive power will be transferred downstream to the Elk's Club Reach, Sunset Reach #6, and Johnson Meadow Middle Reaches. This has the potential to compromise restoration efforts in these reaches.

v. The lack of floodplain access in these reaches reduces the UTR's ability to store water which is a primary component of the climate change mitigation, and will also prevent these reaches from raising groundwater levels further hampering restoration of the flora and fauna.

e. Acquire more land necessary for floodplain connection (project goal). This is especially critical to the restoration of the Johnson Meadow reaches. Restoration of the Johnson Reaches is critical to achieving the restoration goals and objectives of the UTR in the lower section. The LTA reach, located immediately upstream, experienced a limited degree of channel and floodplain restoration. The design of the LTA reach resulted in a limited amount of channel and floodplain restoration. This will result in a limited amount of sediment filtering and retention in the LTA reach and, more sediment will be transported through the LTA reach into the Johnson Meadow reaches. Without a complete restoration of the Johnson reaches, sediment loads in the UTR will remain elevated. This will result in sediment inundation of the UTM and ultimately, Lake Tahoe proper.

f. Adjust the Strategy to truly reflect the potential impacts of climate change on channel morphology (see 1f).

3. What additional guidance can the inter-agency strategy incorporate to ensure the most efficient and beneficial river-wide effort is implemented?

a. Someone needs to step up and lead the inter-agency group. You need a bus driver. You have the bus (UTRWAG) and most of the passengers (CA Parks, USFS, etc). Now you need someone to lead it.

b. Keep all stakeholders involved/egaged. As projects are completed some stakeholders may sense their involvement has finished. All stakeholders need to

stay involved and engaged through completion of all projects and the long-term monitoring. The frequency of the meetings will decline as the restoration projects are completed and monitoring takes over. But everyone needs to stay engaged. It is crucial that all stakeholders stay engaged beyond completion of their project(s). Lessons learned in previous phases will help with the adaptive management strategy throughout the restoration project. Keeping all stakeholders involved will help ensure project success that will translate into shared pride.

c. Regulatory agencies must be willing to relax WQ standards during channel construction. The 15% above normal background is inadequate. Short-term sediment releases are expected during construction, therefore they should be tolerated. There needs to be recognition of the trade-off (benefits) between short-term sediment releases and the long-term benefits of restoration. Short-term sediment releases associated with construction should not significantly impact the clarity in Lake Tahoe. Holding the projects to the standard release (15% above background) is shortsighted, and may result in the abandonment of legitimate in-stream restoration approaches.

d. Get all the information into a single repository (see 5a).

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?

a. The UTR document provides *general* guidelines for developing monitoring plans for stream restoration in the UTR (p.64). It is not clear to me that there has been a basin-wide effort to establish baseline conditions for the physical (channel morphology and upland topography), biological (flora/fauna), and hydrological conditions of the UTR prior to restoration activities. These data will allow for a quantifiable comparison between pre- and post-project conditions. This includes acres of floodplain added, feet of stream channel restored, depth to ground water, type and amount of in-stream fish habitat, number and species of fish, type and amount of vegetation (riparian, meadow, upland).

b. The monitoring plan focuses on restoring natural geomorphic processes. The monitoring results we were provided indicated the monitoring plan was measuring geomorphic form and inferring geomorphic process. This is a start, but these are not the same. I did not see any mention in the monitoring reports provided to us of physical processes that impact geomorphic form, such as shear stress and particle mobility. These can (and should) be estimated for each cross-section.

c. Sediment transport should be estimated. There are multiple methods (equations) available to estimate sediment transport. Determine the most appropriate equation and apply it to all reaches to get estimates on sediment transport.
d. Develop a turbidity – suspended sediment (SS) relationship for the UTR and utilize the relationship to measure success towards achieving restoration goals.
    i. Turbidity is EASY to measure, much easier than actual SS sampling. If you can develop a strong relationship between turbidity and SS across a range of discharges, your monitoring just got cheaper, easier, and more effective.
e. Catalogue all geomorphic information in the same manner so that data from different entities can be readily compared. The three most common options available are:
    i. Excel spreadsheets – readily available and easy to use however, without standard forms things will be different. Also no easy method to display particle size data or get at sediment transport.
    ii. Mecklenburg files – Files developed by Dan Mecklenburg at the Ohio DNR. The modules utilize Excel spreadsheets with pre-developed forms for particle size distributions, longitudinal profiles, and channel cross-sections. Automatically constructs graphics. This is freeware and it's really nice.
    iii. RiverMorph Software – great software for storing and analyzing data. Can do sediment transport analysis based on a variety of sediment transport equations. Need to purchase individual licenses, $2,300 to $3,500 depending upon level of purchase.
f. Every in-stream measurement of channel form/morphology (cross-section, longitudinal profile) NEEDS to have the accompanying water surface elevation measured and plotted. This is crucial information. The time of the measurement should be recorded in the field notes and then correlated with the discharge reported at the appropriate stream gage. The stream gages are real-time reporting, so discharge is reported in specified intervals (such as every 15 minutes). This is crucial for calibrating discharge at-a-station cross-sections and the potential shear stress and accompanying sediment transport.
g. It is unclear to me if a bird survey has been performed along the UTR riparian zone. The UTR restoration desires to increase the habitat for song birds on the UTR floodplain. If a bird survey has not been conducted for each reach it will be difficult to determine the success of this component. The Borgmann work

covers the two Sunset reaches. Have the other reaches been surveyed to establish their baseline conditions?

h. It is stated that the current morphology of the UTR is generally planar and lacks well-defined riffle/pool morphology (field trip). The best approach to quantifying channel morphology is through channel surveys (cross-sections and longitudinal profiles). However, relating morphology to fish habitat is accomplished with a fish habitat assessment that quantifies individual fish habitat units. Having this information will allow for a quantifiable comparison of the before and after fish habitat. Fish habitat should be assessed by an aquatic/fish biologist, not a fluvial geomorphologist because the two (fluvial geomorph and fish bio) "see" the stream differently in very subtle ways. CADW, CA Trout or an independent fisheries biologist could perform this task.

i. Another tool to quantify fish habitat is two-dimensional modeling. Two-dimensional modeling provides information on the extent of inundation through various discharges along with water depths and velocities. Velocity vectors provide insight into erosive forces (shear stress). Water depth and velocity values provide insight into habitat suitability for targeted fish species. A 2D model of the UTR is unreasonable however; a 2D model of a selected reach pre- and post-construction can be utilized as a surrogate for the basin. It seems this might be appropriate for one of the Sunset or Johnson Meadow reaches.

j. Figure 1: Conceptual Monitoring Model. All cross-sections should be taken perpendicular to flow. I know this is a "conceptual model" but I just want to be sure channel cross-sections are perpendicular to flow. The cited protocol from Harrelson (Harrelson et al., 1994) is the desired guide.

k. Use meander geometry data to assess the lateral movement of the UTR. This should be done for all time periods if possible (pre/post-Comstock, pre/post-LTA, etc). it should also be done for the entire UTR and for individual reaches. Sinuosity is the current plan-form data collected. Meander geometry (meander belt width, meander width ratio) provide information on the lateral movement of the channel during different time periods. It will also provide information regarding channel change (migration) following restoration.

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 to restoration projects with the long-term benefits to ecosystem function and resiliency?**

a. No matter what you attempting to communicate to the public, you need to be able to reach them (the public). So the following become key with regards to disseminating information.
    i. There needs to be a single repository for all the information relating to the UTR restoration project. Either its own website, or a dedicated page on one of the major landowner's website (CTC, CA State Parks, Forest Service, etc). You don't want the public to have to search around multiple sites to find information on the various restoration projects. If the information for each project is kept on a separate website it will be extremely ineffective. See the San Joaquin River Group Authority's web page for an example.
    ii. Publish a newsletter both on-line and through the USPS. Again, see the example by the SJRGA.
    iii. Use news releases.
    iv. Utilize a kiosk in the UTM right by the trail bridge across the UTR. This could be a rather large billboard with a map showing the various restoration reaches in the UTR. There could be a handout (newsletter) with the latest news and project updates about each reach.
    v. Stakeholder buy-in is key to the success of your project. Stakeholders in the UTR restoration project include everyone who lives, owns, recreates, and derives some pleasure from the UTR watershed. So this will include most everyone in SLT and a fair amount from outside SLT. Recognizing the common pedestrian as a stakeholder goes a long way in the public's perception of a successful restoration project, and this can translate into support for public funds. You can have a highly successful restoration project, but if it occurred without substantial/adequate input from the general public the perception may be less then successful.
    vi. It seems you will need to know your audience and find an appropriate anecdote. The restoration of an ecosystem is much like having major surgery. First you have the symptoms that cause you to seek advice from experts. The experts use their knowledge and experience to develop a hypothesis of the potential cause(s). Then information is gathered (X-rays, MRI, blood work, etc). The results are then analyzed and interpreted to develop the appropriate course of action. The action may be a combination of approaches such as surgery and diet and/or exercise changes. This is similar to how watershed wide restoration happens.

6. **How should new scientific information and technical advice, obtained as part of the program or project development, be incorporated to improve and expand the river-wide restoration strategy?**
    a. New information/advice should be presented to the UTRAMG asap to discuss the economic feasibility and practicality of incorporating the information/advice into the UTR strategy.
    b. The UTR restoration strategy is predicated on incorporating the best available scientific information. New information needs to be vetted through the Adaptive Management Framework. Is the information/advice a new restoration approach/technique? A new monitoring protocol? A new analysis? A new restoration approach/technique that improves the restoration project should be incorporated as soon as possible so that monitoring may begin. Only then can the effectiveness of the approach/technique be evaluated.
    c. A new monitoring protocol can be incorporated but it should be an additional monitoring protocol in order to maintain continuity of the monitoring methods throughout all phases of the restoration. It should not replace an existing monitoring protocol unless it can be demonstrated that results from the new method are comparable with the old method.
    d. Other issues to consider with new information/advice:
        i. Does it change the perception of how the UTR ecosystem functions? If it does then it must be incorporated into the restoration strategy.
        ii. Will it have a substantial impact on the restoration success of the UTR?
    e. Just do it.
7. **Additional Comments**
    a. Restoration in the UTR watershed cannot restore properly functioning geomorphic channel configurations. Therefore Goal #1 of the restoration approach is unattainable and should be reworded to reflect the limitations of the project and, the influence of anthropogenic features that make this goal unattainable.
    b. Missing key stakeholders such as CalTrans, and CA Trout. CalTrans could also provide funding.
    c. Missing key funding sources such as Trout Unlimited and Ducks Unlimited.
    d. The gages in the UTR basin NEED to be maintained. They are slated to be decommissioned. We need strong lobbying from local, state and federal representatives to keep these gages operational.
    e. Utilize a multi-stage channel design to allow for geomorphic adjustment to changes in hydrology. If the UTRWAG recognizes that the hydrologic regime will

be changing, then it would behoove them to take this into account in their channel design.

f. I had two individuals speak to me after the workshop concluded, one from CTC, the other from CADPR. Both spoke to me about "problems" with a specific recommendation the panel had made.
    i. The person from CADPR told me that they do engage the public, but they always get the same individuals.
        1. My Response: the Panel was suggesting alternative methods to engage/inform the public, not the same old public meeting with a notice and see who shows up. We specifically suggested reaching out via newsletters, outside posters and/or kiosks, etc. My initial reaction is this: if members of the UTRWAG are unwilling to try new approaches then the recommendations are falling on deaf ears.
    ii. The CTC individual had a concern that certain members of the UTRWAG did not care about (value) other members of the UTRWAG.
        1. Response: That's a lack of trust the UTRWAG will need to address if they are serious about being effective. If they cannot learn to trust each other than the UTRWAG is doomed to fail. This person felt that if a member from another organization was put in a leadership role then their voice would not be heard. So if the UTRWAG does appoint someone to head the UTRWAG, the appointed person will need to be skilled in effective collaboration.