

---

---

**LAKE TAHOE RESEARCH GROU****Ex A4**University of California  
Davis, California 95616Tel (916) 757-1322  
Fax (916) 753-8407  
jereuter@ucdavis.eduTo: Carrie Lukacic  
USFS - LTBMU  
Fax - 573-2693From: John E. Reuter, Ph.D. - Director  
Lake Tahoe Interagency MonitoringRE: Comments on Document, "*Adapting Traditional Water Quality Monitoring....to determine BMP Effectiveness*"

I completely agree with your comment towards the bottom of page 1 that impacts of forest management activities include a variety of things including but not limited to soil compaction, groundwater infiltration, nutrient cycling, vegetation distribution, soil erosion, habitat characteristics, water quality and many others. Given this a good monitoring program would evaluate effects of management practice on the most important ones, as determined by previous research, literature studies and/or experience.

I also agree that all impacts can not necessarily be monitored by water quality alone.

Bottom of 3rd paragraph on page 2 could be misleading by stating that water quality data is unreliable for showing meaningful results. This of course could be the result of sampling design for these projects, i.e. the unpredictable and periodic nature of flow events. To partially address this I would recommend that you perform an informal sensitivity of analysis. By this I mean, given the measured/expected flows and the method limits of detection, how much of a sediment or nutrient load would you have to have to be able to detect an actual change. For example a load on the order of kilograms may not be detected in either the flow is too high and/or the material is delivered over a long period of time. However, if the major flow events are not sampled there will be little hope of detecting an impact unless it is extremely large. We always do event-sampling for LTIMP.

You mentioned that auto-samplers are not user friendly because of programming problems. I'd like to discuss this with you more. Also along this line, I can't find the information at the moment but I do know that the USFS up on the North Coast is highly involved with using *in situ* turbidity monitors. If I remember correctly they calibrated them to TSS and found them very useful. I've always wanted to contact these folks but never found the time, perhaps you know them. I'd like to discuss this further with you at some time.

Regarding the four points laid out for reconstruction of traditional water quality monitoring:

1) The use of visual observations certainly has it's place in any BMP monitoring effort. I think they should be designed on a project-by-project basis to customize their representativeness. The big issue we face with BMP's, both at Tahoe and elsewhere, is translation of visual observations to water quality impacts. I would be very much in favor of running some specific WQ monitoring tests to quantify the visual observations. Visual observations are well suited to erosion control projects but not necessarily control burn projects or forest health restoration projects. So I agree with their use when appropriate, it's just that they are not appropriate for all conditions.

2) I think this always should be done. It's important to keep in mind that a single year might not be enough time not only for monitoring but to actually see a impact, especially with variable water years and other impacts such as soil compaction, changes to nutrient cycling, etc.

3) I agree! Sampling designed around the individual BMP can be effective. In our own research we have identified the need for both localized BMP sampling and stream sampling to assess watershed conditions. The specific design will depend on the BMP.

4) This topic left me wanting for more specific suggestions. Clearly WQ by itself is not always the answer to all BMP questions. We have adopted the approach with CTC projects that we do of asking a series of relevant questions before doing anything. We then design monitoring/evaluation around answering these questions. This is an effective approach. On the basis of this last item, I surmise that you want to rely much more heavily on visual observations. As I mentioned above, they are not always appropriate. Again, designing around specific questions helps.

I would like to discuss this more with you. You've put your finger on a very good issue, i.e. what is the best way to evaluate BMP effectiveness and impacts. WQ does place a key role but it requires a good design. Visual observations can be useful under certain, but not all, circumstances.

Please call if there is anything I can do to help you with this. It's a critical issue and one that needs to be much further resolved before it can be implemented in the field.

Carrie I hope this helps. Let's talk.