

Development of a water quality modeling toolbox to inform pollutant reduction planning, implementation planning and adaptive management

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Annual Accomplishments Update (October 1, 2008-September 30, 2009) ¹:

(1) Based on meteorology (MET), hydrology and water chemistry data collected since 2004 the watershed and lake clarity models are being re-validated, vis-à-vis 2005-2007. The watershed modeling team now has the data need for this work and are in the process of model simulation for those 3 years. Once complete this will be transfer to the lake modeling team. At that point this task will be complete. (2) Progress on the user-friendly packaging of both these models is well underway. The lake model has been fitted with a user-friendly interface and the user manual is over 80% complete. Data input files have also been categorized and been made available. The product has been specifically designed to dovetail into the crediting system and has been presented to the water quality agencies overseeing the Tahoe Maximum Daily Load (TMDL) program. Work on the user-friendly watershed model application is also underway. The sub-contractor working on this aspect is creating a manual/ user interface similar to other they have done. Training will be the last aspect of this task. Both modeling teams have also created detailed information on model use, input and out data files and other aspects of model operation to the TMDL agencies in response to public inquiries. (3) Since this work began the lake modeling team has updated fine sediment input file to the clarity model, helped developed downscaled MET data in order to improve the spatial resolution by covering a larger area in the Basin and begun running the 3-D model for the nearshore. As the project continues actions to link both the lake clarity and 3-D lake circulation will be tested to examine, nearshore-pelagic (offshore) hydraulic connectivity. (4) Work on linking the Pollutant Load Reduction Model (PLRM) and the Loading Simulation Program in C++ (LSPC) Watershed Model is commencing. The goal of this task was not to develop a fully functional, integrated model – this is a very significant effort that is beyond the intended scope of this grant. Rather the workplan calls for examination of a series of key issues that must be considered prior to any future linkage. The PLRM was just released in October 2009 and therefore it was premature to work on this task until that time. Based on simultaneous runs has been found that pollutant loading estimates from these models may differ. Since LSPC was designed to operate at the basin-wide scale and the PLRM at a much smaller scale, the team is currently studying the likely explanations for this difference and how the functional differences associated with the resolution in the two models can be resolved to produce relatively consistent results. These function differently, each with their own set of assumptions and data input requirements. This was the first time that PLRM was run for a geographic scale larger than it was developed. At this stage it is not usual for two such models to have apparent discrepancies. A comparison is part of this grant's scope of work and it is possible that more resources that originally considered under Task #4 may have to be allocated towards this issue. (5) The watershed modeling team has now developed the approach

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to update the watershed model to address wildfire. The actual models runs have not yet been done. (6) Since this grant was written members of the team have been developing a unified MET database for Tahoe for this and other projects, including a downscaled database that simulates MET conditions under climate change scenarios. Over the next few months all these will be assembled to finalize Task #6 and make recommendations for a unified MET input data file that can be used for modeling.

Progress Report: October 1 to December 31, 2009

(1) The watershed modeling team is still in the process of developing the hydrology and loading data from the 2005-2008 water years for use the further validation of the watershed and lake clarity models. Once complete, this model output will be directly compared to the field data collected by the Lake Tahoe Interagency Monitoring Program. It will also be sent to the lake clarity modeling team so that model can also be validated. (2) Work on the user-friendly packaging of the watershed and lake clarity model continues. The lake clarity model remains about 80% complete. We are busy running the model for and number of scenarios. If necessary, work to date will be modified on the basis of all these runs. Clarity model still requires a more easy-to-use graphic user interface. The watershed model is concurrently undergoing an update for the national TMDL Toolbox. (3) Work during this quarter on linking the 3-D and lake clarity model have been minimal. (4) A significant effort was expended this quarter looking at the comparison between LSPC and PLRM output. An analysis of sediment loading from urban areas showed that the LSPC might give values as much as twice as high as the PLRM. The SNPLMA team identified the most likely explanations for this difference and tested them using both models. The DCIA or directly connected impervious area turns out to be an important factor. LSPC assume that all urban flow flows out of each sub-watershed and downstream while PLRM allows for infiltration within the urban zone. We have spent a considerable amount of time discussion the potential effects of this finding on baseline load allocations within the Tahoe TMDL. (5) The watershed modeling team has now developed the approach to update the watershed model to address wildfire. The actual models runs have not yet been done. (6) As part of SNPLMA the team has been actively evaluating existing MET databases to assist in defining conditions under climate change. Over the next few months all these will be assembled to finalize Task #6 and make recommendations for a unified MET input data file that can be used for modeling.