Understanding and Predicting Sediment Resuspension and its Effect on Particle Size Distribution and Nutrient Enrichment at the Near-shore of Lake Tahoe

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Historically mid-lake clarity has been the primary response variable for the environmental management of Lake Tahoe. Consequently, processes within Lake Tahoe's near-shore zone have received less research attention. Both mid-lake and near-shore clarity continue to decline over time. Declining mid-lake clarity is predominantly controlled by fine inorganic particles. The near-shore zone, by contrast, appears to be more biologically productive, suggesting that both nutrient fluxes and fine particle distribution contribute to declining near-shore clarity and overall water quality. The aim of this study is to compare the rate of sediment resuspension due to wind-wave action with sediment inputs from streams and storm outfalls in the near-shore zone. With an understanding of near-shore sediment resuspension, it will be possible to quantify its contribution to local particle concentration and size distribution, and nutrient enrichment, and thereby to assess the impact on near-shore water quality. Direct measurements of near-shore currents, wave height, and direction spectra will be made using a bottom-mounted AWAC. Two Vectors will be co-located with the AWAC to measure velocity shear within the boundary layer to better parameterize sediment resuspension in the littoral zone of Lake Tahoe. These direct measurements will facilitate model development and calibration. A time-varying three-dimensional circulation model of the near-shore will be coupled with a sediment resuspension model, both to be developed as part of this study. Ultimately, the models are intended to be predictive tools used to guide water management decisions, permitting an informed review of the near-shore water quality standards.