

## **An Analysis of Hydrologic Variability Sensitivity in the Colorado River Basin**

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**Abstract.** Reclamation has historically depended on the observed natural flow record to model the effects of hydrologic variability in their long-term planning studies. Understanding there are limitations to this assumption Reclamation recently developed five sets of alternate future natural flow scenarios that include parametric and nonparametric stochastic scenario generation techniques as well as data from two recent paleo reconstructions completed within the Colorado River Basin. The observed natural flow record has traditionally been resampled with the nonparametric Index Sequential Method (ISM) to assess the effect of natural variability. In addition to the future inflow scenario generated with this method and data, the ISM was used to resample the two recently published paleo reconstructions pertaining to the Colorado River basin, the longest dating back the 762AD. Also, a new nonparametric method that resamples the flow magnitudes of the observed natural flow record conditioned on the hydrologic sequences seen in the two paleo reconstructions and a parametric CAR(1) model were added to the suite of stochastic techniques for generating alternate future inflow scenarios. These five future inflow scenarios were used within Reclamation's long-term planning model to assess their effects on key system variables including reservoir storage, reservoir release, river flows, and the likelihood of shortage and surplus. These analyses allowed Reclamation to assess the sensitivity of the hydrologic resources to hydrologic variability.