American Water Resources Association
2009 SPRING SPECIALTY CONFERENCE
Managing Water Resources Development in a Changing Climate
May 4-6, 2009
Anchorage, AK

Wednesday, May 6
3:30 PM – 5:00 PM
Session 36: Changing Impacts on Reservoir Management

1. HGS-M – A Tool to Conjunctively and Dynamically Simulate Hydrologic Processes and Multi-reservoir Systems for Evaluation of Climate Change Impacts - Mary Kang, HydroGeoLogic, Reston, VA (co-authors: Varut Guvanasen, Kirk Nelson, George Matanga)

Computer models are frequently used to guide decisions pertaining to the operation, planning and management of multi-reservoir systems such as the California State Water Project (SWP) and the federal Central Valley Project (CVP) water system. CALSIM, developed by the California Department of Water Resources and the U.S. Bureau of Reclamation (BOR), is the standard reservoir-river basin simulation model for studies relating to the large and complex SWP/CVP water system. HydroGeoSphere, developed by the BOR, University of Waterloo, Laval University, and HydroGeoLogic, is a distributed-parameter, fully-integrated surface-subsurface numerical model that accounts for three-dimensional variably-saturated subsurface flow and two-dimensional overland flow or overland flow into one-dimensional stream channel. HydroGeoSphere is well suited for physically-based predictions of the impacts of climate change with regard to surface-subsurface hydrology, temperature, and water quality, and has been successfully applied at regional scales to the Central Valley of California, at continental scales to Canada and the northern portion of the United States, and at local and regional scales in North America, Europe, and Asia. To benefit from functionalities of both HydroGeoSphere and CALSIM, a dynamic linkage between HydroGeoSphere and CALSIM is being developed to facilitate conjunctive simulation of hydrologic processes and multi-reservoir systems without oversimplified representations of key physical processes. The resulting HGS-M (HydroGeoSphere-Management) system provides a generalized comprehensive tool for evaluating the impact of climate change on water resources in an integrated and optimal manner. Numerous research and development initiatives for HGS-M are on-going and plans for more exist. Initiatives include applications of HGS-M, the construction and prediction of hydrometeorological data for HGS-M simulations, and the establishment of a methodology for the inclusion of future data as they become available. These efforts will play a crucial role in the simulation of climate change scenarios, driven by hydrometeorological data.

3. Southeast Alaska Hydropower: Reconsidering Climate Variability and Change in the Development Process - Jessica Cherry, University of Alaska Fairbanks, Fairbanks, AK (co-authors: Amy Tidwell, Nancy Fresco, Sue Walker)

The goal of this project is to assess whether recent precipitation and reservoir inflow anomalies in Southeast Alaska are within the normal range of variability over the observational record, or whether they are evidence of a potential regime shift associated with climate change. Total and seasonal water availability (rain and snow pack) appears to be changing with climate throughout southeast Alaska where hydropower supplies the majority of electricity. NOAA-Fisheries, Alaska Region and three climate and hydropower experts at the University of Alaska-Fairbanks are working with the municipal hydropower utilities managers to 1. Apply their understanding of large-scale climate variability to Southeast Alaska precipitation, temperature, evapotranspiration, snow pack, and reservoir inflow 2. Study long-term climate projections and watershed responses (mean and variability) downscaled to the catchments feeding the reservoirs 3. Consider how natural variability on seasonal-to-decadal scales and longer-term climate change affects water resource management. Progress to date is shown here.