American Water Resources Association
2009 SUMMER SPECIALTY CONFERENCE
Adaptive Management of Water Resources II
June 29 – July 1, 2009
Snowbird, UT

Tuesday, June 30
3:30 PM – 5:00 PM
SESSION 28: Reservoir Operations using Adaptive Management 2

1. Development of Adaptive Management Strategies for a Recently Licensed Hydropower Facility - Jory Oppenheimer, Puget Sound Energy, Bellevue, WA (co-author: Robert Barnes)

Puget Sound Energy's (PSE) Baker River Project (Project) consists of two reservoir developments on the Baker River, a tributary to the Skagit River, in northwestern Washington State. The reservoirs are managed for hydropower generation, flood control, fish and wildlife, and recreation. The Project received a new 50-year license from the Federal Energy Regulatory Commission (FERC) in October 2008. As part of implementing the new license, PSE is required to implement the conditions of the Water Quality Certification (sometimes referred to as "the 401") prepared by the Washington State Department of Ecology (Ecology). The Water Quality Certification requires PSE to demonstrate that the operation of the Project complies with the state's water quality standards. The Project's Water Quality Certification focuses on four water quality parameters: • Temperature • Dissolved Oxygen • Total Dissolved Gas • Turbidity Compliance for these parameters will be based primarily on adaptive management approaches, instead of meeting specific numeric criteria. These adaptive management approaches require conducting technical studies and analyses, assessing regulatory options to meet compliance, and preparing financial feasibility studies over the next 3 to 10 years. Ecology has recently adopted these adaptive management approaches for their regulation of hydroelectric facilities. The adaptive management approaches includes detailing strategies for maintaining the highest attainable water quality condition to best protect aquatic life. This presentation describes why adaptive management approaches were selected for the Project's Water Quality Certification, the specific proposed adaptive management approaches for these water quality parameters, the concerns of the regulators, potential issues and challenges, and the anticipated outcomes.

2. Adaptive Management of Water Supply Reservoirs on the Delaware River - Roger Ruggles, Lafayette College, Easton, PA

Water supply reservoirs in the northern portion of the Delaware River watershed have been increasingly identified as potential flood mitigation tools. In the recent past three floods have occurred along the Delaware River resulting in millions of dollars in damages in communities along the river. Each reservoir was originally constructed to supply drinking water to New York City through trans-basin diversion. As drinking water reservoirs the management strategies are to impound as much water as possible to protect customers from potential drought conditions. At many times this has resulted in the reservoirs being at greater than 100% capacity. Since the water is transferred outside the drainage basin of the Delaware River any flooding along the river does not impact the drinking water customers. Individuals living along the river see the reservoirs as potential detention basins for severe rainfall events. Lowering the water surface elevation in the reservoirs would provide a "void" which could potentially hold a portion of the flood waters felt in downstream reaches. The "voids" in the reservoirs decrease the total storage of drinking water and increases the risk of water shortages to the drinking water customers. This paper examines each of the three floods and investigates potential changes in the management of releases from the reservoirs to mitigate flooding in the downstream reaches while being understanding of the water supply needs of New York City. The paper first assesses the potential impact that the reservoirs could make on flooding if voids were maintained. A water management scheme is then develop to provide a measure of flood mitigation while minimizing drought risks. Simulations for the three flooding events are then modeled to demonstrate the trade-offs in total risk.

3. Issues in Assessing Short-Term Water Supply Capabilities of Reservoir Systems - Spencer Schnier, Texas A&M University, College Station, TX (co-author: Ralph A. Wurbs)

The Texas Commission on Environmental Quality (TCEQ) uses a Water Availability Modeling System to support long-term regional and statewide water resources planning and management. The water availability studies are based on the modeling capabilities of the Water Rights Analysis Package (WRAP). The goal of this research is to expand WRAP and develop other decision support tools to improve short-term river basin management. When consideration of current reservoir storage levels is important, conditional reliability modeling is used to assess the likelihood of meeting targets for in-stream flow, reservoir storage, water supply diversion and hydroelectric power generation in the near future (next month to next several years). Data from the Brazos River Basin water availability modeling system is used to assess key complexities of water supply reliability analysis in general and conditional reliability modeling in particular. These key complexities include uncertainties associated with river basin hydrology, estimating yield-reliability relationships for individual reservoirs and reservoir system operations, conventional long-term planning versus short-term adaptive management and other modeling and analysis issues. Traditional and newly developed methodologies for calculating firm yields and water supply reliabilities are evaluated. Guidelines are developed regarding the practical application of conditional reliability modeling. Operating policies are determined that optimize water supply reliabilities under different demand scenarios. The modeling capabilities of WRAP were expanded to support near real-time operation of dams under various streamflow conditions.