

**American Water Resources Association**  
**2009 ANNUAL WATER RESOURCES CONFERENCE**  
**November 9-12, 2009**  
Seattle, WA

**Tuesday, Nov. 10**

**3:30 PM – 5:00 PM**

**SESSION 33: Watershed Planning and Management**

**The Salt Lake Countywide Water Quality Stewardship Plan – A New Era in Watershed Planning in Utah - Nicholas Von Stackelberg**, Stantec Consulting, Salt Lake City, UT (co-authors: Neil Stack, Karen Nichols)

The Salt Lake County watershed comprises 806 square miles with 300 miles of streams and rivers, national forest lands and ski resorts in the Wasatch Mountains, large scale mining operations in the Oquirrh Mountains, and an urban core with a population of over one million people. Since the 208 Water Quality Plans of the 1970's, watershed planning in Utah has been primarily undertaken through the auspices of the TMDL program, generally with narrow targeted end points. In 2006, Salt Lake County voluntarily initiated the development of a self-financed integrated watershed plan in order to protect and enhance the water quality in the County. The Salt Lake Countywide Watershed Water Quality Stewardship Plan (WaQSP) was adopted in 2009. The planning elements included the economics of water quality, water supply, industrial and wastewater point source discharges, stormwater management, nonpoint source pollution, stream habitat, instream flows and headwaters protection. With stakeholder involvement throughout, the planning process entailed characterization of the watershed, identification of water quality concerns and opportunities for improvement, development of a six-year implementation plan, and establishment of a monitoring program to evaluate plan success. Some of the unique aspects and challenges encountered during the development of the WaQSP include the following: Complex Hydrology: The complex nature of water resources management in the County, based on consideration of water rights, flood control and effluent discharge, necessitated multi-jurisdictional coordination to identify feasible opportunities for enhancement of instream flows and water quality. Monitoring Protocols: A science-based index was developed to establish baseline conditions and to monitor the effectiveness of watershed management. The index combines 29 metrics that represent physical, biological and chemical characteristics of the river and stream corridors. Adaptive Management: The WaQSP will be updated every six years, incorporating current hydrological, chemical, ecological and social data. A six-year implementation plan was prepared that proscribed an investment of over three million dollars. Stakeholder Involvement: An important aspect to the WaQSP was involving the numerous authorities and jurisdictions with often competing objectives. A public survey was conducted and an annual watershed symposium was initiated as part of the plan.

**Seasonal Streamflow Forecasting in the Columbia River Basin - Andy Wood**, 3TIER, Inc., Seattle, WA (co-authors: Matthew Wiley, Bart Nijssen)

Climate and hydrologic fluctuations in the Pacific Northwest lead to large variations in the strength of the Columbia River hydropower resource from year to year. We describe and present results from a seasonal hydrologic prediction system for the Columbia River basin that gives insight into the seasons-ahead behavior of this resource starting near the beginning of each water year. The forecast system is based on the real-time application of a state-of-the-science, macroscale hydrologic model coupled with ensemble climate forecasts. Estimates of initial land surface conditions, primarily in the form of snow water equivalent, are improved via the assimilation of snowpack observations, and forecast biases are reduced through statistical forecast calibration. We also discuss the sources and limits of hydrologic predictability in the Pacific Northwest, basing our evaluation on a long-term retrospective hindcast dataset that includes our primary forecast locations.

**Using an Innovative Asset Management Framework to Improve Watershed Health and Program Effectiveness - Jennifer Belknap Williamson**, Brown and Caldwell, Portland, OR (co-author: Carol Murdock)

Clackamas County Water Environment Services (WES), Oregon is retooling its surface water management program to more effectively improve water quality, reduce hydromodification impacts, and enhance aquatic habitat. WES is using a unique asset management framework to assess watershed health and develop a cost-effective, targeted approach to enhancing ecosystem services while facilitating sustainable development and meeting regulatory requirements. Asset management concepts such as level of service have not been widely applied to the management of watershed health, however they offer benefits for creating defensible program approaches. As a part of WES' Watershed Action Plans, watershed assessments are performed to identify reach-level metrics of watershed health and specific management strategies. The metrics and management strategies are used to develop actions, which are prioritized based on the expected change in watershed health metrics and closing the gaps in the desired level of service. The assessments focus on three aspects of the watersheds, (1) stressors in the landscape such as impervious surface; (2) responses to stressors such as stream flow and channel stability; and (3) key indicators of watershed health such as B-IBI scores, flood conditions, and water quality measurements (concepts adapted from Booth et al, 2004 and Karr and Yoder, 2004). The key indicators of watershed health are compared to established criteria, such as a desired B-IBI score for the streams based on the "biological potential" estimated using the bioassessment tool developed by the Water Environment Research Foundation (Barbour et al, 2007). These criteria are also used in the development of levels of service. Through work-flow mapping and the watershed assessment, WES evaluated the effectiveness and level of service gaps in its program elements. Action recommendations were developed based on specific management objectives for each stream reach and contributing area. To create a repeatable decision-making process, the Plans utilize a level of service-based prioritization tool to assess the costs and benefits of existing and proposed programmatic activities and capital investments. The Plans provide WES with a detailed roadmap for implementing a management program that addresses regulatory requirements such as TMDLs and its municipal NPDES permit while strategically improving watershed health through targeted actions.

**Managing Floods and Droughts in an Interstate Basin - Carol Collier**, Delaware River Basin Commission, West Trenton, NJ (co-author: Amy Shallcross)

The Delaware River Basin serves as water supply for over 15 million people. Since its inception in 1961, the Delaware River Basin Commission (DRBC) has been working with its members (New York, New Jersey, Pennsylvania, Delaware and the Federal Government), as well as New York City to manage the water resources of the basin. The river is the longest undammed river east of the Mississippi. The Delaware has always been considered a river of droughts until 2004 when we receive three large floods in less than two years. Since that time we have been evaluating flood mitigation options, considering not only the potential effectiveness for flood mitigation, but the ancillary impacts to drought management for water supply and instream flows necessary for ecological communities and recreation. USGS, USACE and NOAA NWS are just completing a reservoir flood model for DRBC. The model includes 13 reservoirs in the basin and can be used to test different reservoir operating plans, including whether drinking water reservoirs should be required to have flood mitigation capacity. In addition, our Flood Advisory Committee is developing recommendation for better management of riparian lands and flood hazard areas. In our presentation we will discuss the intricacies of balancing water management needs in the four-state basin, discuss our proposal for more holistic water management and recommendations for specific actions. We will also discuss some of the problems we stumbled over along the way and provide a section on lessons learned covering technical, social, legal and policy issues.

**The Honey Lake Project: Environmental Restoration on a Military-Impacted Unique Water Resource and the Use of a Non-Profit to Assist in Land Transfer - Jane Rowan**, The Bioengineering Group, Inc., Newtown Square, PA (co-authors: Wendi Goldsmith, Julie Africa)

Honey Lake, located adjacent to the Sierra Army Depot, is a nearly 100 square mile shallow alkaline lake with no outlet. Fed by the Susan River on the northern shore and Long Valley Creek on the southern

shore, the lake levels fluctuate significantly. A legacy of the site's service to the military is OE/UXO contamination on 2500 acres in the eastern section of the lake. Among other tasks, Bioengineering Group (BioGroup) was challenged with identifying remedies compatible with conservation of endangered species habitat and public access on adjacent lands, both in terms of technical parameters and public perception. Six years and three phases progressed for the project to assist the Corps in cleaning up the site, enhancing habitat for endangered species and limiting environmental harm before the property could be transferred to its final recipient, the California State Land Commission. This effort included a number of tasks, including an engineering evaluation/cost benefit economic analysis (EE/CA) to develop removal actions for the OE/USXO. Water and sediment samples were collected to assess additional contaminants, including lead, TNT, DNT, RDX and other contaminants found in trace amounts in Honey Lake. During the conveyance of property—the pre-transfer phase—concerns over UXO were raised, and addressed. An ecologically integrated cap was designed to prevent buried UXO from becoming exposed as a result of wave and wind erosion. This cap also provided useful habitat for the endangered butterfly species, the Carson Wandering Skipper (*Pseudocopaeodes eunus obscurus*). A significant effort included interfacing with the public as well as several Native American tribes. In addition to the contamination problems, the site contained a wealth of fossils and native worship and lodging sites. There were also water supply issues, and major local history associated with the lake, including the use of the lake by steamboats. The transfer of land from the Army to the State of California used an innovative approach of employing a “non-profit” organization as an intermediary, to undertake the stewardship and clean-up of the property in a manner acceptable to a diverse group of stakeholders.