

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

**Tuesday, Nov. 10**  
**10:30 AM – 12:00 Noon**  
**SESSION 25: GIS**

**GIS-Based Storm Water Inventory for NPDES Phase 2, a Thurston County Washington Example - Chris Hansen, Tetra Tech, Stanwood, WA (co-author: Ed Whitford)**

In 2008, Tetra Tech's GIS Service Center embarked on a pilot project to inventory storm water structures and assets in the NPDES Phase 2 planning area of Thurston County. The effort began with an exhaustive analysis of internal business requirements and Washington Department of Ecology requirements for MS4 communities operating a storm utility under a Phase 2 NPDES permit. Tetra Tech designed an enterprise Geodatabase structure to support an RTK GPS-based inventory of storm features in the field that considered not only NPDES permit reporting requirements, but also necessary components for a forthcoming enterprise asset management system and hydraulic modeling efforts that require precise pipe invert elevation measurements. Important elements of this project include use of NPDES Phase 2 compliance experts, coordination of sub-meter GPS equipment and field personnel, establishment of a local control network, Geodatabase design for storm utilities, and the automation of processing GPS-located structures into a GIS Geometric Network. The notable data element of this project is the creation of a comprehensive storm conveyance network, including the location and mapping of pipes, culverts, and ditches. This included the inventory of storm water sinks, such as regulated outfalls, detention ponds, swales, and low-impact development structures. The resulting Geodatabase will be instrumental in managing storm assets and meeting all regulatory reporting requirements.

**The Future for Hydrography in the National Map - Jeff Simley, U.S. Geological Survey, Denver, CO**

The National Map is a collaborative effort among the U.S. Geological Survey and other Federal, state, and local partners to improve and deliver topographic information for the Nation. The hydrography for The National Map is represented using the National Hydrography Dataset (NHD) and the Watershed Boundary Dataset (WBD). A principle characteristic of these datasets is their ability to allow analysis using Geographic Information Systems (GIS). This analysis can greatly extend the science and resource management applications in the U.S. by providing a rich set of information that can be processed by computers to produce interrelationships of the data to reveal cause and affect relationships in the environment. The future of these datasets must be highly aligned with the applications to help propel the science and resource management forward. To do this five factors must be addressed: (1) suitable content in the data, (2) the necessary integration of that data, (3) the characteristics of the data, (4) the modeling of the data, and (5) web services for use of the data. The data content needs call for greater feature detail and a larger suite of feature types in the dataset. An example is the need for water diversions in the data. The data integration factor involves both the inter and intra relationships of data themes. An example is the need to properly integrate surface water features with elevation data. Data characteristics need to be addressed increasing the intelligence of the data. An example is the flow information on water diversions. The data model needs to be addressed to maximize the efficiency of the analysis operations. An example is how diversion flow information can be efficiently accessed by a query looking at recharge rates on reservoirs. Web services provide outstanding opportunities to extend the utilization of hydrography information beyond the workstation environment. An example is performing the above query over the web. The USGS is committed to providing the right form of geospatial data, at the right time, to supply the continuously advancing analytical capabilities in science and resource management.

**Populating Watershed Models on the NHDPlus Scale using National Data Sets: Methods and Opportunities - Michele Cutrofello**, RTI International, Washington, DC (co-authors: Brandon Bergenroth, Jay Rineer, Robert Truesdale, William Cooter)

Increasingly, national data sets are becoming more readily complete and available (e.g. USGS's Watershed Boundary Dataset, NRCS's SSURGO). The National Hydrography Dataset Plus (NHDPlus) provides the networked hydrology needed to underlay many of these national datasets in modeling applications. RTI has created a seamless NHDPlus coverage for the conterminous United States from the hydroregion data available for download. Using this seamless coverage we have developed methods to georeference various spatial datasets and tabular values to NHDPlus catchments. Innovative techniques within an Oracle Spatial framework allow for efficient combing of spatial and tabular data. In place of typical model applications which are populated on a case study-by-case study basis, we seek to provide a consistent and flexible framework for populating various watershed models in any region of the country. By using standard methods and data sources model results can be more easily compared between regions and types of modeling applications (e.g. intermediate versus completely deterministic model representations). Generalized coding and database construction allows for adaption to various data types required of the different watershed models and output objectives (e.g. water allocation models examining low flow conditions, water quality models examining standards exceedences). The NHDPlus catchment network provides smaller scale representation of watersheds (average size 2.5 km<sup>2</sup> nationwide) than other watershed boundaries but also provides the opportunity to combine catchments to form watersheds of varying size. The combination of the generalized data framework and adaptable watershed network creates a powerful tool for future model development and application.

**Introducing the CUAHSI Hydrologic Information System Desktop Application (HIS Desktop) and Open Development Community – Jiri Kadlec**, Idaho State University, Idaho Falls, ID (co-authors: Daniel P. Ames, Teva Velupillai, Jeff Horsburgh)

The U.S. National Science Foundation supported Consortium of Universities for the Advancement of Hydrologic Sciences (CUAHSI) Hydrologic Information System (HIS) project includes extensive development of data storage and delivery tools and standards including WaterML (a language for sharing hydrologic data sets via web services); and HIS Server (a software tool set for delivering WaterML from a server); These and other CUASHI HIS tools have been under development and deployment for several years and together, present a relatively complete software "stack" to support the consistent storage and delivery of hydrologic and other environmental observation data. This presentation describes the development of a new HIS software tool called "HIS Desktop" and the development of an online open source software development community to update and maintain the software. HIS Desktop was envisioned as a local (i.e. not server-based) client side software tool that ultimately will run on multiple operating systems and will provide a highly usable level of access to HIS services. The software will provide many key capabilities including data query, map- based visualization, data download, local data maintenance, editing, graphing, data export to selected model-specific data formats, linkage with integrated modeling systems such as OpenMI, and potentially upload to the HIS server from the local desktop software. As the software is presently in the early stages of development, this presentation will focus on design approach and paradigm and is viewed as an opportunity to encourage participation in the open development community. Indeed, recognizing the value of community based code development as a means of ensuring end-user adoption, this project has adopted an "iterative" or "spiral" software development approach which will be described in this presentation.