

## **American Water Resources Association GIS in Water Resources Conference**

The American Water Resources Association bi-annual conference on GIS in Water Resources was held in San Mateo, California March 17-19. The conference featured 230 papers with a very large number involving the NHD. Fifty papers were presented by government agencies, 70 by universities, and 110 by consulting firms. In addition to the large number of papers involving the NHD, other major topics involved hydrologic information systems, cyber infrastructure, and LIDAR. Dr. Robert Twiss gave the keynote talk discussing San Francisco bay area delta issues such as dangerous flood plains, impacts on salmon migration, and mandated water restrictions caused by plugging of water pumps by smelt. The large and highly-developed Sacramento-San Joaquin delta is composed of 19 bathtub-like islands protected by levees and susceptible to sea-level rise and upstream flooding. Dr. Twiss discussed the many conflicts that exist between natural ecosystems and developed lands.

Here is a sampling of papers presented. More papers will be described in the April and May newsletters.

*An ArcHydro Geodatabase from High-Resolution NHD* – Christine Mundy (St. Johns River WMD) discussed the role of ArcHydro in the five water management districts in Florida. Surface water protection and flooding are major issues in the state. ArcHydro is used for modeling with the source of data coming from the 1:24,000-scale NHD. Thousands of edits have been performed on the NHD primarily involving connectivity, flow direction, and names. Many features have been added to help connectivity gaps. In the St. Johns district, medium-resolution NHD was first used and later switching to high-resolution. This resulted in a large increase in data management, going from 10,000 to 118,000 features and 412 to 106,000 lakes. Most editing is on flowlines, while most waterbody edits are deferred. Canals pose the greatest challenge due to complex density and flow direction uncertainties so emphasis is on the major channels. Many springs and monitoring points have been added to the ArcHydro dataset, which could be a large benefit to the NHD. Updating will be a constant process to continuously refine the dataset.

*WBD Certification and Stewardship Status in California* – Lorri Peltz-Lewis (BOR) talked about the Watershed Boundary Dataset in California noting the continuous improvement through iterative processes involving workshops throughout the state. The elimination of administrative boundary influences, the roles of dams and levees, and the handling of coastlines have been important topics.

*Stewardship of the Watershed Boundary Dataset* – Dan Wickwire (BLM) presented on the development of strategy for stewardship of the Watershed Boundary Dataset, which includes the creation of an issue paper endorsed by a large number of users in 32 states. Dan noted the extensive resources committed to the WBD and the need to address a variety of issues such as the need to develop WBD stewardship in concert with NHD stewardship, the post-certification process, and addressing 7<sup>th</sup> and 8<sup>th</sup> level WBD. Recommendations include development of a strategic plan, defining roles and responsibilities, defining the roles of NRCS and USGS, primary responsibility for stewardship at the state level, stewardship agreements similar to NHD, linkage between NHD and WBD, and a NHD/WBD joint database. The development of WBD in Geodatabase is seen as a big advantage. The linkage between NHD and WBD will greatly improve quality assurance of both databases.

*Estimating Perennial Streams in Idaho Using a Regression Model of 7-Day, 2-Year Flows* – Al Rea (USGS). Idaho uses a definition of perennial stream as a 7-day low flow of greater than 0.1 cfs over a two-year span. Regression models use drainage area as the dominate factor followed by precipitation and slope. Various regression equations work well in some areas, but not in others. A check of the results in a GIS is often necessary to discover which regression equation is producing reasonable results for a given area. A major factor on performance is the lack of data at the low end of the flow spectrum. The use of higher flow data points in the regression model and then extrapolation down to the low flows can produce questionable results. For this reason the estimation of very low flowing streams is very difficult. The use of new technology, temporary and portable stream gages on low flowing streams would be able to develop more data at the low end of the flow spectrum. This would lead to better low-end streamflow prediction.

*Meeting the Hydrologic Mapping Needs of North Carolina Stakeholders: Local Resolution NHD* – Kristy MacDougall (Watershed Concepts). Hurricanes in 2005 had a major impact on the western, upland parts of North Carolina. Addressing the impact on the landscape saw many agencies call for detailed stream mapping to the six-acre drainage limit. An extensive testing program using USGS DOQ's, local imagery, LIDAR, DEM's, and shaded terrain images was conducted to determine the most effective and economical production methods. No one method was satisfactory so a hybrid approach was adopted using multiple sources. A custom toolset of production tools was created. The data was developed at 1:4,800-scale and output in the NHD schema, but with some additional fields added. It vertically integrated to the high-resolution NHD using a batch conflation process. The NHD change management system was fully utilized to track the data. A comparison of the end product with the existing high resolution NHD showed a noticeable improvement, with the degree of improvement dependent on the landcover. Generally, 70% of the high-resolution NHD was within 15 feet of the new product and 85% within 25 feet. The new data was input into the Local-Resolution NHD database.

*Development of a Global River Transport Modeling and Observation System* – Bill Samuels (SAIC) described a project to model river discharge into the oceans on a worldwide basis. This work contributes to studies affecting coastal circulation for the U.S. Navy. The project looked at the NGA VMAP stream network, the USGS Hydro1K stream network, and USGS HydroSHEDS 90-meter STRM data, all available on a global basis. Also used for modeling were satellite rainfall estimates, rainfall forecasts, GDAS PET fields, FAO soil data, land use/land cover, and elevation data. The project has focused on derived streams and catchments from STRM elevation data. The HydroSHEDS data has proven to be a significant resource in this study. See <http://hydrosheds.cr.usgs.gov/>

*NHD-Based Modeling of Stream Habitat Fragmentation and Steelhead Distribution in California Anadromous Watersheds* – Martina Koller (Pacific States Marine Fisheries Commission) presented on work done to study the decline of Steelhead Trout. The Steelhead Trout issue prompted improvement studies, which have then led to the need to identify which stream are used by Steelhead. A Steelhead distribution model was developed taking many factors into consideration. Steelhead observations were made and indexed to the NHD, then these locations were navigated to the ocean, and stream routes identified. The resulting map of Steelhead streams shows about 1,400 streams based on 9,700 Steelhead observations. The Steelhead habitat has been fragmented by dams, culverts, ditches, clogged streams, dried-up streams, and logjams. This led to the development of a fish passage database showing complete, partial, and potential barriers. From this open and blocked habitat can be mapped. This will then lead to restoration efforts, including the removal of dams. The modeling identifies natural limits of the Steelhead and the quality of the habitat. The study shows the need for a standardized database like the NHD and demonstrates the power of navigation and linear referencing.

## High Precision Data

Only the NHD data distributed in the file-based geodatabase uses high-precision. This means that a number of applications running in ArcGIS 9.2 cannot use personal geodatabase NHD data without a high-precision conversion. In the near future, users will have an option to obtain a high-precision personal geodatabase.

## March Hydrography Quiz / New April Quiz

Jennifer Sharpe was the first to correctly guess last month's hydrography quiz <ftp://nhdftp.usgs.gov/Quiz/Hydrography32.pdf> as the St. Louis metro area with the Mississippi River cutting from the northwest down to the southeast, the Missouri River running into the Mississippi from the west, and the Illinois River merging into the Mississippi up at the top. The big blank spot is the St. Louis metropolitan area. Typically very little hydrography is shown in metropolitan areas due to engineering of the surface water network into stormwater systems, and the need for cartographic clarity in urban areas on topographic maps. Jennifer is a geographer working for the USGS Illinois Water Science Center in Urbana, Illinois. She primarily provides GIS assistance to the Center's project staff. Jennifer spearheaded the Illinois StreamStats project and will soon act as the leader for the Illinois NHD Primary Stewardship team. Others with the correct answer were (in order received) Roger Barlow, Melony Barrett, Jory Hecht, David Straub, Ken Koch, Matthew Jefferson, Matt Gerike, Calvin Meyer, David Asbury, Roger Anzzolin, and James Seay.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography33.pdf>. The diversity in the stream drainage pattern is what makes this hydrographic snapshot unique. Try to locate the four different drainage patterns identified in the map: contorted, trellis, dendritic and annular. Use the inset maps as your guide. Rich in physical and human history, these fold mountains define the unique drainage patterns exhibited by the hydrography. The river to the south serves as the border between two states and is also where Montgomery Clift decked John Wayne in a 1948 Hollywood production. Where is this? Like horseshoes and hand-grenades, you only have to be close.

## Upcoming NHD Geo Edit Tool Training

March 31 - April 4, 2008, Tallahassee, Florida, Contact Carl Nelson [cwnelson@usgs.gov](mailto:cwnelson@usgs.gov) or David Anderson at [David.S.Anderson@dep.state.fl.us](mailto:David.S.Anderson@dep.state.fl.us)

## Upcoming NHD Applications Training

April 24, 2008, Kansas City, Missouri, see <http://www.magicgis.org/magic/symposiums/2008/index.cfm>

May 7, Dearborn, Michigan, contact Steve Aichele at [saichele@usgs.gov](mailto:saichele@usgs.gov)

May 8, Lansing, Michigan, contact Steve Aichele

June 3-5, Ottawa, Ontario, GeoTech Event 2008, see <http://www.geoplance.com/ME2/Default.asp>

Hawaii in planning stages, contact Henry Wolter at [hwolter@usgs.gov](mailto:hwolter@usgs.gov)

California is in planning stages, contact Carol Ostergren at [costergren@usgs.gov](mailto:costergren@usgs.gov)

Sept. 15-19, Oregon and Washington, contact Sheri Schneider at [sschneid@usgs.gov](mailto:sschneid@usgs.gov) or Allyson Jason at [ajason@usgs.gov](mailto:ajason@usgs.gov)

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Jeff Simley, USGS, assumes full responsibility for the content of this newsletter.