

USGS National Hydrography Dataset Newsletter
Vol. 11, No. 5, March, 2012
by Jeff Simley, USGS

NHD/WBD Stewardship Conference

The fourth bi-annual NHD/WBD Stewardship Conference held March 29 and 30 was a huge success with over 120 people attending from 45 states and 45 making presentations. The conference was held in New Orleans, Louisiana in conjunction with the American Water Resources Association's 2012 Spring Specialty Conference on Geographic Information Systems and Water Resources VI.

Day One, Morning I

The conference started with an overview of conference objectives by Jeff Simley. These were:

1. Develop the potential for data stewardship.
2. Develop the hydrography community.
3. Understand the state of stewardship today.
4. Understand the needs of the community.
5. Learn about resources that can help.
6. Develop stewardship for the future.
7. Develop a self-correcting process.

Sheri Schneider of the USGS then presented on the NHD GNIS update project for Oregon on behalf of Bob Harmon of the Oregon Water Resources Department. There are over 26,000 hydrography features in Oregon of which 19,431 are in the NHD and 6,605 are not for a variety of reasons. Some cases involve names coordinates that are difficult to apply to the real world or the NHD, such as when a lake name is positioned between two lakes. 54% of problems dealt with adding a GNIS name to existing NHD, 14% dealt with correcting a GNIS name on an existing NHD feature, 26% involved editing a feature in the NHD for an existing GNIS name, while the remaining 6% had to do with a GNIS correction only.

Next, Linda Davis of the Idaho Department of Water Resources focused on the state's work with irrigation entities to help update the NHD. This work involves identifying areas that need updating, assessing the needs of NHD users, education, working with local sub-stewards to get the best information, providing tools and data, and follow-up and support. User needs often involve water accounting, fish passage, flooding, and modeling. While irrigated lands only make up a portion of the state, these waters are highly engineered, complex, and of vital interest to much of the activity in the state.

Following this was a panel on Programs for Improving the NHD in Hawaii, Virginia, Massachusetts, and Kentucky. Maliea Beach-Smith discussed her ongoing work in Hawaii to fix errors such as disconnected streams and improving names to comply with local practices. Maliea's efforts are producing an outstanding NHD for the state. Chris Swanson working under contract to Virginia presented the involvement of several state partners contributing to the NHD. Much of the work in Virginia deals with identifying impaired waters and the need to improve the NHD to meet the demands of pollution control work. Brian Brodeaur talked about getting stewardship started for the Massachusetts Department of Environmental Protection. Much of the work involves protecting public drinking water supplies, water withdrawals/transfers, impaired waters, and discharges to groundwater. Jim Seay discussed Kentucky's efforts to obtain local hydrography data, improving names, and incorporating karst streams into the NHD.

Day One, Morning II

A panel on local resolution updates was formed with input from Mississippi, New Jersey, North Carolina, and Indiana. Jim Steil of the Mississippi Automated Resource Information System got things going. Then Jeff Hoffman talked about 1:2,400-scale coverage for New Jersey based on elevation models of the same scale. This produced much improved WBD at the HU-14 level. Joe Sewash of the North Carolina Center for Geographic Information and Analysis talked about the NC Stream Mapping initiative involving coastal mapping, urban drainage, and local resolution integration into the main NHD database. Mike Martin from the Indiana Department of Natural Resources discussed organization in the state and work on local resolution to meet user needs for more detailed streams. Important issues were alignment with imagery and GNIS integration. Stream starts were based on 6-acre drainage areas while lakes were based on a quarter-acre minimum. In one example of a subbasin, 2,177 flowlines and 2,571 waterbodies were found in the 24K NHD while 47,821 flowlines and 3,350 waterbodies were found in the local resolution. Integration with National Wetlands Inventory, state dams databases and karst streams were important. This was followed by a presentation from Susan Phelps of AECOM, the contractor that did the work in Indiana and Mississippi. The Mississippi effort is a pilot project. An 18-acre drainage criteria was used for starting streams. Two-foot orthos and LiDAR with 5 foot contour DTMs were used. Susan stressed the role of conflation in the process. She then noted similarities in work done for Mississippi, Indiana, and North Carolina. These include: all used pilot projects, upstream drainage area used to determine scale of mapping, streams and waterbodies digitized from a combination of imagery and terrain, perennial/intermittent not determined, urban areas most challenging, and coastal components not included as of yet.

Jim Mitchel and Kurt Johnson of the Louisiana Department of Transportation and Development then focused on Mississippi River Delta in Louisiana. They started by noting the many unique hydrologic characteristics of Louisiana, which include the rapid rate of landscape change that makes hydrography go out-of-date very fast and making most topo map hydrography obsolete. Of particular note is the massive loss of marshes in the delta. Challenges to revision include the large extent of features needed change. The NHDGeoEdit tool is not well equipped for wholesale feature replacement. It is expected that there will be continual landscape change on a large scale that will make maintenance a long-term problem. One thing that can be done is to use different policies for upper basin-freshwater dominated zones, mid basin-freshwater/saltwater mixing zones, and lower basin-saltwater dominated zones. The NHD GeoConflation Tool is seen as an important tool for Louisiana to handle massive changes.

A panel was then held on an update of Watershed Boundary Dataset activities. Karen Hanson of the USGS led off discussing fundamentals of WBD and its oversight and operational organization involving USGS, NRCS, EPA, USFS, and BLM, plus the State Stewardship Work Group. Karen noted a product and service plan to plot the next five years of the program. She then discussed trans-boundary harmonization with Canada and Mexico, followed by coastal issues, and GNIS integration. The USGS' Stephen Daw then outlined the plan for WBD-NHD integration involving the strong relationship between the two datasets within the database structure. This also involves spatial integration and the development of new opportunities such as basin flow tables. Stephen also talked about the new WBD Edit Tool. Laura Davenport of Natural Resource Conservation Service looked into some of the details of work on HU-14's in New Jersey. She then gave a good overview of how vital the WBD is to the NRCS mission, noting the improvements that will be possible with LiDAR. Laura noted how floods, hurricanes, tornadoes, and wildfires are important issues for NRCS and gave examples of conservation efforts by NRCS for recovery and restoration. She noted that NRCS is working hard to speed up the delivery of important information for these projects. Many examples were given of NRCS work all over the nation for which the WBD is a critical asset. The Mississippi River Basin Healthy Watersheds Initiative is one example.

Day One, Afternoon I

The afternoon started out with Ricardo Lopez discussing the results of the study he led on Best Practices in the use of LiDAR for Hydrographic Network and Hydrologic Boundary Extraction. Here is an overview of the findings: (1) The Federal LiDAR specification V13 nominal pulse spacing needs to be improved for challenging ground cover patterns, (2) Metadata needs to be standardized and improved, (3) Protocols for the use of orthophotography and other ancillary datasets needs to be developed, and (4) The role played by underground stormwater infrastructure needs focus. Recommendations include: (1) Refer to the bare-earth surface as LiDAR-derived, (2) Conclusions are valid for any high resolution bare earth surface irrespective of technology used, (3) A summary report is needed, (4) Ensure complete area coverage, (5) Improve project cost analysis, (6) Improve conflation tools, (7) Clarify expectations for NHD, (8) Clarify WBD guidelines, (9) Improve stormwater representation, (10) Vertical integration of elevation and NHD/WBD needs to resolve several issues such as dealing with flat areas and point of stream initiation, and (11) Address NHD/WBD matching at project edge.

Ricardo Lopez then led a panel discussion on LiDAR experiences. Craig Ducey of BLM discussed a workflow for delineating stream networks from LiDAR-derived DEM's to update the NHD in the Pacific Northwest to evaluate practicality. The workflow involves (1) Preparing the LiDAR-derived DEM's and developing an initial stream network, (2) Coordinating between NHD stewards and GIS editors, and (3) Migrating original attributes to the new geometry and preparing metadata. Craig then showed examples of work and presented a list of 13 conclusions, which included the need for ancillary information and analytical modeling versus heads-up digitizing. Jeff Hoffman of New Jersey then talked about building high resolution DEM's and WBD for overlapping LiDAR point clouds to build 1:2,400-scale elevation and hydrography for the state. One of the issues is that New Jersey had LiDAR collected using several different missions, each with different specifications. The overlap between the areas showed that the LiDAR results were somewhat inconsistent. Jeff showed many images stepping through the production process. Particularly evident was the need to iterate through the process after adding new culverts. New Jersey is still refining the process for the rest of the state with the intent to produce better WBD. Brian Quinn from Marin County in California then discussed NHD Local Resolution - a Community Approach for Hydrologic Enforcement of Topography Data. Brian found that super high resolution (40cm) elevation data can provide excellent hydrography, but it needs ancillary data, particularly stormwater and culverts, local expertise, and interactive editing to make it work. One meter DEMs are able to support quarter-acre drainage areas for ephemeral stream creation. Like others, Brian showed many excellent graphics illustrating the work. He noted that stream network aesthetics are important to gain acceptance of the automated methodologies.

Rounding out this section was a presentation by Jim Steil of Mississippi and Claire Rose of the USGS on LiDAR work in Mississippi. Jim focused on the Mississippi Alluvial Plain between Memphis and Vicksburg where the terrain varies about 4 inches per mile, a real challenge to hydrography mapping. They generated one foot contours and corresponding breaklines. This allowed the production of good hydrography that corresponds well to imagery at 1:2,400-scale. Claire then talked about the development of HU-10 and HU-12 level WBD in the northern part of Mississippi in problematic areas. 8.5cm accuracy bare earth DEM's were used and would certainly result in revisions to the HU-10 WBD. A number of LiDAR errors, such as mismatched seams and missing data, impacted the analysis process, but eventually these were fixed. A workflow process was described which involved using Arc-Hydro and hydro conditioning the elevation data to produce better results.

Day One, Afternoon II

Karen Hanson and Kristiana Elite of the USGS, and Keith Larson of the NRCS, presented on interbasin transfers with focus on the Central Arizona Project (CAP) delivering water from the Colorado River to

Phoenix and Tucson. They described water transfer conveyance structures and how they are represented in the NHD and how WBD encodes transfers. To enhance the functionality of WBD to handle this, a number of changes to WBD practices were presented. These mainly deal with the Modification field involving line and polygon. Another useful innovation is the development of a flow table to indicate unit-to-unit flow involving one-to-one, one-to-many, and many-to-one relationships. A good set of graphics were presented illustrating the CAP and how diversions are implemented in the NHD and WBD. The idea of primary and secondary distribution networks was described involving agricultural, municipal, recharge, and tribal uses.

Paul Caffrey of the Wyoming Geographic Information Center outlined the work being done in Wyoming. This includes adding linearly referenced events with state level information on dam, gaging stations, and diversion structures. As an example, 1,458 dams were added to the NHD inventory. Additionally geographic names were checked for missing, misspelled, and misplaced names from GNIS in NHD. These problems were caused by low resolution GNIS coordinates and interpretive mistakes made during GNIS conflation. An example of this work is the naming of 638 previously unnamed waterbodies, while 294 cannot be corrected due to unreliable GNIS coordinates. Over 600 point features are also not named. There are also many WBD edits such as 1,309 updated HU-12 names. Wyoming also worked on a pourpoint project where WBD outlets are reference to the NHD network. In doing this work a number of discrepancies were uncovered.

Next up was Brian Sanborn of the USFS and Dan Wickwire of the BLM talking about federal agency stewardship of the NHD. Dan discussed BLM's priorities for water and riparian programs including Proper Functioning Condition for riparian-wetlands. He discussed the Riparian Database System, which will make good use of the HEM tool in the NHD, but also affects non-NHD features and affects the National Wetlands Inventory.

Genna Ashley of Idaho and Ann Fritz of North Dakota. Genna started out talking about the use of the 1:24,000-scale based WBD in the state and noted a very long list of those who make use of it. The WBD is used for such things as flood modeling, reservoir capacity, water district boundaries, land use planning, aquatic species conservation strategy, watershed vulnerability, clear-cutting, fisheries data, and pollutant load models. She ran through the WBD stewardship process and workflow, which involves collecting input from a broad range of users. A case study was presented illustrating the state's process. Ann Fritz then talked about the extensive use of WBD in North Dakota involving biologists, local water resource boards, counties, state, and federal agencies. The state has two distinct geographies with a hilly western, and flat eastern halves of the state. In many cases, particularly in the east, the drainage systems are ill-defined making mapping challenging. North Dakota has an extensive border with Canada, which makes harmonization significant. Partnerships are working well and communication is successful. Areas of improvement are in WBD editing and NHD editing, which should improve with new tools coming on board.

Steve Aichele and Vick Lukas presented on the USGS Stewardship Assessment Study to develop ways to strengthen the USGS-partner hydrography stewardship efforts. They noted that the USGS is focusing its topographic mapping mission on elevation and hydrography. The USGS is also developing priority Communities of Use which includes a segment on water to be headed by Steve. In conjunction with this, the USGS geospatial liaisons will play a more direct role in hydrography. The National Geospatial Advisory Committee will also be enlisted to help analyze and develop stewardship. The stewardship assessment goals are to characterize stewardship status to determine what is working and what can be done better in order to improve stewardship. Stewards have been surveyed with a sampling and more stewards will be surveyed later. The status of stewardship participation in several categories was presented. The USGS has awarded 95 grants to develop the NHD and stewardship totaling some \$4.5-million dollars resulting in significant advancement of the program. A map of the nation showing where

NHD maintenance through stewardship has taken place was presented indicating extensive work in Nebraska, Florida, New York, Louisiana, Texas, Washington, Oregon, Montana, Wyoming, Minnesota, New Hampshire, Alabama, Kentucky, Michigan, and Arkansas amongst other states. The study showed (in order of importance) NHD use in water quality reporting, streamflow modeling, water quality modeling, fisheries management, rainfall/runoff modeling, water rights, and hydro-electric management. Thirty-five states indicate that stewards work regularly with the USGS hydrography Points of Contact. Obstacles to stewardship indicated by stewards includes (in order of importance) lack of funding, complexity of the tools, lack of staff, complexity of the NHD, lack of interest in stewardship, lack of training, and lack of interest in the NHD. Things that could be changed include a less complicated editing process, synchronization with software vendor releases, and a dislike of using The National Map viewer for downloading data. Next steps in the process are (1) continue to collect information from stewards, (2) analyze the responses, (3) define priorities, and (4) develop a course of action.

Day Two of the conference will be covered in the next NHD Newsletter.

Access to NHD/WBD Stewardship Conference Powerpoints

The powerpoint presentations presented at the 2012 NHD/WBD Stewardship conference will be made available through the NHD web site <http://nhd.usgs.gov>. Look for the stewardship section. You can also access these at <ftp://nhdftp.usgs.gov/Workshops/Conference12>. Use the agenda in this folder as a guide.

Call for Input on Documentation by Dave Arnold

As most stewards are aware, the now obsolete NHDGeoEditor Tool came with very little documentation explaining how to use it. In May 2010 the U.S. Geological Survey, began work on NHD Editor Tool 4.0.1. Part of this project was the creation of a documentation team that met weekly via teleconference to discuss the best way to present information on how to use the new tool. The team decided to create a web-based help document that could be accessed from both the tool's help menu and from the stewardship website. Creating a help system that is not reliant on the tool version allows the documentation to be updated quickly and separately from version releases. Along with this web-based documentation, the team chose to create a number of videos, most of which give an overview of processes, with the written documentation providing step-by-step details. Dave Arnold with the NGTOC office in Rolla developed the written documentation, while Kristiana Elite with the NGTOC office in Denver created the videos. Paul Kimsey provided direction and quality control for the project. The current documentation details how to use the tool, but it does not provide insight into when each of the editing processes might be needed. With the initial tool release behind us, we are looking to add a section on "How Do I ... ?", that will explain how to correct errors that appear during quality control checks. We am interested in hearing from stewards who have suggestions for articles you would like to see in this section or, if you have a wish list for other information you would like to see in the help documentation, please e-mail Dave Arnold at darnold@usgs.gov.

NHD Photo of the Month

This month's photo was submitted by Linda Davis. It is Lake Caroline in the Alpine Lakes Wilderness is within the Okanogan-Wenatchee National Forest. Lake Caroline is part of the Enchantment Lakes. It's not far from Leavenworth, Washington. To see the photo of the month go to ftp://nhdftp.usgs.gov/Hydro/Images/Lake_Caroline.jpg. Submit your photo for the NHD Photo of the Month by sending it to krisham@usgs.gov. This will allow the program to build a library of real-world photos linked to the NHD.

February Hydrography Quiz / New March Quiz

Jennifer Sharpe of the USGS Illinois Water Science Center was the first to guess the February NHD Quiz as Okanagan Lake in British Columbia, Canada. Canada you say? Yes the NHD covers the borders of both Canada and Mexico. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography79.pdf>. Jennifer Sharpe works for the USGS Illinois Water Science Center in Urbana, Illinois, as a GIS specialist. Some of her current work includes developing flood inundation surfaces for several sites around Illinois, assisting with the various Great Lakes Research Initiative (GLRI) projects, calculating basin characteristics for the a Chicago Urban Flood Frequency project, and providing general GIS and mapping assistance when it's needed in the Center. When not doing GIS, Jennifer can also be found out collecting water-quality samples for the ambient water-quality network and keeping her fellow employees safe as the collateral duty safety program coordinator.

Others with the correct answer (in order received) were Gerry Daumiller, Al Rea, Angi Auger, Joe North, Doug Clark, Steve Shivers, David Straub, Jim Sherwood, Bob Denoudend, Richard Patton, Evan Hammer, Katherine Kolb, Matt Rehwald, Ed Carter, Zsolt Nagy, Florence Thompson, Tom Denslinger, Ingrid Landgraf, Jim McDonald, Stephanie Kula, Wade Peerman, and Roy Hull

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography80.pdf>. Name the lake. It's located in a state not known for exciting hydrography features although the state does share the Ohio River. Send your guess to jdsimley@usgs.gov.

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Thanks to Dave Arnold, and Kathy Isham.

The NHD Newsletter is published monthly. Get on the mailing list by contacting jdsimley@usgs.gov.

You can view past NHD Newsletters at http://nhd.usgs.gov/newsletter_list.html

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