USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

Sixth Year of the NHD Newsletter

This issue of the USGS NHD Newsletter marks the beginning of the sixth year of the Newsletter. The NHD Newsletter has been produced for the past sixty-one consecutive months containing a total of 163 pages of information on the latest developments in the NHD program and technology. You can see past NHD Newsletters at http://nhd.usgs.gov/newsletter_list.html.

NHD Stakeholders Meet to Discuss Future of the NHD – Part II

This is part II in a synopsis of issues discussed when a number of the Nation's NHD experts gathered in Denver the week of October 10 to plan future development efforts. See the October 2006 issue of the NHD Newsletter for Part I.

National Water Information System and StreamStats

The National Water Information System (NWIS), operated by the U.S. Geological Survey to provide information on surface water, ground water, and water quality, is not yet tied into the NHD. A joint USGS/USEPA effort indexing the streamgages to NHD was a first step at geospatially referencing streamgages to the NHD network. Results of that effort are now available for download as event tables from the NHDPlus web site. The USGS StreamStats program, however, has made the NHD integral to its work by using the NHD as the foundation for the stream network. Although StreamStats can use any elevation surface-based model, all but two of the 27 states currently implementing StreamStats have used a process that pre-conditions the raw elevation data to conform to a well-defined stream channel and waterbody definition provided by the NHD. The NHD data first is preconditioned by editing it into a dendritic layer in which features like braided streams are pared down to single channels and divergent sinks eliminated. This dendritic drainage pattern is then burned into the elevation data to insure proper flows across the terrain. Over eighty-percent of the StreamStats work to date uses the high resolution NHD. The two states (Idaho and Washington) that did not burn the NHD into their DEM are currently revising their data using NHD. Idaho is using high-resolution NHD, while Washington is using the NHDPlus, which is based on the medium-resolution NHD. Both states plan to replace the data behind their StreamStats web sites in the next few months, and the new data will align much better with the NHD.

Watershed Boundary Dataset

The integration of the NHD and the Watershed Boundary Dataset seems logical, yet each is managed and operated as a separate program. The WBD is funded and produced on a state-by-state basis. As can be expected, the WBD in some states was produced quickly and in other states has been on hold waiting resources. Fortunately the USEPA has stepped in to give a much needed funding boost to the program, although not quite enough to complete the nation. Completed WBD goes through a final certification process with 15 states fully certified thus far. An additional 12 states have been provisionally certified meaning that edge matching with adjacent states is not yet complete. These data are produced from 1:24,000-scale source data meeting a federal standard and at a minimum matched to Digital Raster Graphics. Where available, the certified sixth-level hydrologic unit WBD geometry is provided with the NHD geodatabase in the Hydrologic Units feature dataset although the full attribution of the WBD is not included. The NHD is often used in the WBD process to help understand drainage networks and waterbody extents. In this process it becomes evident how the NHD and WBD need to fit one another geometrically. As stand-alone products, this does not necessarily happen. As the 1:24,000-scale NHD rapidly reaches completion with the WBD completion at its heels, much of the opportunity to integrate

the two dataset within the production process will have been lost. However, the goal is that as the NHD is maintained in stewardship, enough knowledge of the WBD will have been gained to make better data integration decisions. Likewise, as the WBD enters into a stewardship phase, WBD editors may be able to better use NHD knowledge in their work. Furthermore, it seems reasonable that the two datasets be maintained through integrated stewardship, in which the editing of a geographic area involving one dataset will include the other dataset. To do this, editors will need to be cross-trained in each product. A considerable effort will be needed to accomplish this because the programs are distributed over 50-plus state and territory organizations and consequently will involve the cross-training of hundreds of editors. To be successful, the NHD and WBD programs need to be integrated at levels above the first-line editor, to also include state NHD steward and state WBD coordinator organizations, and within the USGS organization.

Elevation Data

Water and the land are inherently integrated on the surface of the earth and it, therefore, only makes sense that hydrography and elevation data be inherently integrated as themes in a GIS. Yet, up to now, each dataset is more or less produced independently and, although coincidence is common, it was often not enforced in production. As these themes become more advanced, the need for a more integrated relationship is being realized. Elevation data is integral to such applications as NHDPlus and StreamStats and in order to assure the proper integration with hydrography, the elevation data is being modified with the NHD to better define stream channels and waterbodies. The production of 10-meter DEM's also involves modification with NHD. Now on the horizon is applicability of a new form of elevation data using LIDAR. LIDAR technology is becoming affordable over relatively large areas and the possibility of deriving a new representation of hydrography is at hand. Much of the NHD was derived from an interpretation of landscape shading on aerial photographs revealing the location of stream channels, which were then often field verified. LIDAR can provide a more definitive result by quantitatively detecting the indentation of a stream on the landscape. The stream can be detected either by automated filters that comb the landscape to convert flow grids into vector streams or by viewing enhanced shading for visual interpretation. Already the state of North Carolina is employing LIDAR to generate a new coverage of the NHD. This is not just a laboratory experiment, but rather an actual production program. The results will have huge implications on the future of the NHD. The technology is not without problems, but the North Carolina experience will likely encounter these and provide recommendations. The USGS is heavily involved in the applicability of LIDAR. You can learn more about this at http://lidar.cr.usgs.gov/.

National Wetlands Inventory

Speaking of data integration, what could make more sense than integrating the nation's wetlands database with the nation's hydrography database? Well, don't hold your breath. Although the opportunities are enormous, the funding is not. At a spatial level, overlaying the NWI with the NHD would obviously provide a greatly enhanced geospatial representation of the landscape. How well the features fit together has not been thoroughly tested, but it is known it would not be as simple as assembling a jigsaw puzzle. It is anticipated that the spatial editing costs would be quite high. But, the benefits would also be quite high. Knowing what streams drain in and out of wetlands and how wetlands are interconnected in the hydrography network would be a huge benefit to science. Another great opportunity is the ability to integrate the two themes within a common data structure. The advanced design of the NHD geodatabase lends itself to the integration of the data. The biggest factor is that the two programs are programmatically about as independent as they can get and the hope of integration is largely beyond any resources available. Perhaps a pilot project over one subbasin could demonstrate the advantages and help promote the idea.

The NHD at the U.S. Environmental Protection Agency

The NHD is used at the USEPA to support the Clean Water Act. One of the principal benefits of the NHD has been as an integrator of programs dealing with water. Upwards of twenty different water

programs are linked by using the NHD as their common spatial reference system, providing better science through better data interaction. Much of this work is oriented around the identification and mitigation of impaired water in the nation's waterways. A major accomplishment at the USEPA is the production of the NHDPlus, which has been covered regularly by the NHD Newsletter. It will provide a tremendous boost to water science by providing an entirely new level of intelligence about the geospatial water features. The USEPA will continue this momentum by developing additional tools for the NHDPlus and looking at high resolution NHDPlus. Additionally, the USEPA will be developing enhanced web services for its NHD related programs and improve access to data including events linked to the NHD.

The NHD at the U.S. Forest Service

The NHD has been an integral part of the USFS Natural Resources Information System Aquatics Module providing not only a single source for hydrography data, but also standardization, allowing the forests across the country to use common practices. In the future this concept will be expanded by implementation of the NHD in an enterprise system that will cover all data themes including hydrography. The idea is to provide one overarching data and application system for the national forests that will provide one-stop shopping for Forest Service data. Additionally, the USFS will become heavily engaged in the stewardship of the high resolution NHD across the country. The USFS has played a major role in the development of the high resolution NHD for the Nation.

The NHD at the Bureau of Land Management

The BLM is now beginning to take advantage of the availability of the NHD in its land management programs. This will not be a national application, but rather a program implemented on a state office basis as the BLM is currently organized. The BLM is currently developing the Event Management Tool to be released in the Spring that will be of great benefit to the overall NHD community in the addressing, maintenance, and analysis of events linked to the NHD.

The NHD at the National Park Service

The NPS also approaches its land management in a decentralized fashion with the NHD being employed on a park-by-park basis. The NHD is used in studies along with wetlands, vegetation, soils, geologic and other themes of GIS data. The NPS jointly funded the development of the NHD over many national parks across the country.

NHD GeoConflation Tools

The NHD GeoConflation Tools (NHDGCT) under development at the USGS will provide automated capabilities for production of local resolution NHD. NHDGCT will perform feature delineation and reach code conflation on feature-coded vector hydrography data to produce a subbasin of NHD data in the geodatabase format. For those familiar with NHDCreate, NHDGCT will perform conflation and post-conflation processing of NHDCreate, but resulting output will be the geodatabase format. Input data required for NHDGCT are feature-coded coverages, or other vector formats, similar to that generated through NHDCreate pre-conflation. In addition, preliminary data assessment and possibly semantic mapping will be required for input data. All NHDGCT processes are performed through an ArcGIS ArcMap interface. The initial version will be available in January 2007. The January release will not include a full set of quality control and assurance checks (QAQC). Pre-conflation—network building, waterbody centerlining, feature coding, etc.—and QAQC processing are planned for future releases. The tools are currently being tested by state cooperators in West Virginia using local resolution hydrography data derived from 1:4,800-scale orthophotography.

National Geospatial Technical Operations Center (NGTOC) A-76 Study

In September 2005, the U.S. Geological Survey (USGS) announced an A-76 Competitive Sourcing study of the National Geospatial Technical Operations Center (NGTOC). This is the USGS group that

manages, produces, maintains and distributes the National Hydrography Dataset. The USGS has established two Most Efficient Organizations: one in Lakewood, Colorado and one in Rolla, Missouri, that will compete along with the private sector to become the consolidated site. The functions to be performed by the consolidated site are defined by the Performance Work Statement (PWS). The estimated date for issuing the request for comment on the Performance Work Statement is December 12, 2006. The estimated final date for submitting comments is January 9, 2007. You can review the current draft PWS by going to http://www.usgs.gov/contracts/A76_CS/NGTOC_index.html. As stakeholders in the NHD program, you are encouraged to review and comment on the December 12 document since this will define the functions performed by the USGS. See section 5.2.2 of the May 12, 2006 draft for the section on hydrography. For official information, go to http://ideasec.nbc.gov/j2ee/login.jsp and enter document number 06HQSS0002.

Answer to October Hydrography Quiz / New November Quiz

Al Rea of the USGS Idaho Water Science Center was the first to correctly guess last month's hydrography quiz ftp://nhdftp.usgs.gov/Quiz/Hydrography17.pdf as Table Rock Lake in Southwestern Missouri. Al is a hydrologist and GIS specialist with USGS Water Resources Discipline. He has been working with the NHD since 1997 when the "Visual Pass" and the "Friends of the NHD" advisory committee were taking place. In those days he was in the Oklahoma City USGS WRD office. Al works part time for the USGS Enterprise GIS office, and one of his roles is to enhance coordination on geospatial data between the four separate disciplines represented in USGS (Biology, Geography, Geology, and Water). Al recognized Table Rock Lake because it caused him great consternation a few years back when he was working with an interdisciplinary team trying to "synchronize" the NHD and the Elevation Derivatives for National Applications (EDNA) data. The lake became known among the team as "The Dragon Lake," because it looks like a Chinese Dragon. The NHDPlus, which Al also works on, was a direct outgrowth of those synchronization attempts. Others with the correct answer were: David Asbury, Barbara Ruppel, Melvin Landry, Mark Naftzger, and Yanning Wei.

For the November quiz look at ftp://nhdftp.usgs.gov/Quiz/Hydrography18.pdf. Can you identify where this is? There is something very significant about Reach 17100204000211. What is it and what is its commonly used name. The name in the NHD is not the commonly used name. The first eight digits of the ReachCode identify which subbasin this is located in. There is another reach in Montana that also claims the same fame as this reach. Send your guess to jdsimley@usgs.gov.

Upcoming One-Day NHD Application Workshops

San Diego, CA – January 30, 2007. Contact Carol Ostergren at costergren@usgs.gov
Redlands, CA – February 1, 2007. Managers Overview. Contact Carol Ostergren.
Redlands, CA – February 2, 2007. Contact Carol Ostergren at costergren@usgs.gov
Indiana – March 13 2007. Contact Dave Nail at dnail@usgs.gov.
Idaho – April 2 and 3, 2007. Contact Frank Roberts at fmroberts@cdatribe-nsn.gov.
Michigan – May 7, 2007. Contact Steve Aichele at saichele@usgs.gov.
Illinois – Winter, 2007. Contact Shelley Silch at ssilch@usgs.gov.

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