USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

NHD Update Process – Migration to Windows 7, ArcGIS 10x – by Paul Kimsey

Windows 7 implementation will be gradual such that USGS staff can continue to use mission-critical applications until such time as they are available for use in the Windows 7 environment, or until Microsoft drops support for Windows XP in April 2014. The National Geospatial Technical Operations Center (NGTOC) plans to complete the transition from Windows XP to Windows 7 by December 31, 2012. Partners editing the NHD with the current version of the NHD Update tool (v4.0.3) report that there is a requirement to continue supporting an ArcGIS 9.3.1 (Windows XP) editing environment in the near term and also support an ArcGIS 10.0, Windows 7 environment as we move to an ArcGIS 10.1, Windows 7 editing environment. The diagram at ftp://nhdftp.usgs.gov/Workshops/MigrationToArcGIS10.docx shows the *proposed* plan for migration of the NHD update process. Note that the conflation tool will remain at ArcGIS 9.3.1, Windows XP and Windows 7 in the short term and migrate to ArcGIS 10.0, Windows 7 as soon as possible.

What's New with the National Hydrography Dataset Plus Version 2? – by Tommy Dewald

The National Hydrography Dataset Plus (NHDPlus) is a suite of geospatial products that build upon and extend the capabilities of the NHD (1:100,000-scale) by integrating it with the National Elevation Dataset (30M) and the Watershed Boundary Dataset. Interest in estimating NHD stream flow volume and velocity to support pollutant fate-and-transport modeling was the driver behind the joint U.S. Environmental Protection Agency and U.S. Geological Survey effort to develop NHDPlus. NHDPlus has been used in a wide variety of applications since its initial release in the fall of 2006. This widespread positive response prompted the multi-agency NHDPlus team to design an enhanced NHDPlus Version 2 (NHDPlusV2).

NHDPlusV2 benefits from significant improvements to its primary ingredient datasets as well as a more robust stream flow estimation process. The USGS has connected over a thousand isolated networks in the NHD, the National Elevation Dataset has been enhanced for over 40% of the country, and the Watershed Boundary Dataset, for which only 12 states were available for use in the initial NHDPlus, has been completed for the country. NHDPlusV2 stream flows now incorporate improved runoff estimates from a USGS national water balance model and new components, such as, excess potential evapotranspiration, major water withdrawals and additions, and network-interpolated adjustments to align with gaged flows. Additional information on NHDPlusV2, including the user guide, data, and metadata, can be found on the EPA WATERS Web site at http://www.epa.gov/waters (NHDPlus quick link on the right). The public release of NHDPlusV2 is scheduled to be completed September 2012.

Moving Towards a High Resolution NHDPlus – by Tommy Dewald

The national geospatial surface water framework (“*geofabric*”) continues to evolve. The High Resolution NHD/WBD is updated by its national stewardship community to reflect the best available stream network – actually, a patchwork quilt of multi-resolution networks. At the same time, NHDPlusV2 – which integrates the latest medium resolution NHD stream network with the landscape as represented by the 30M NED – showcases the additional analytical power provided by value-added network and catchment attributes that enable the modeling of stream flow, water quality, etc. In addition, advances in LiDAR and IfSAR technologies promise a rich new source of even more highly-detailed stream and catchment features.

As this evolution towards a High Resolution NHDPlus occurs, the NHD program is striving to inform the water resources user community of how the existing medium resolution NHDPlus and High Resolution NHD datasets can be used together to meet their current programmatic needs. For example, High Resolution NHD streams can be associated with NHDPlus catchments to leverage both the detailed high res stream network with the NHDPlus value-added attributes and elevation data.

For those who would like to develop high resolution NHDPlus, the NHDPlusV2 production tools were designed to also work with more detailed ingredient data, such as 1:24,000 or better hydrography data and 10M or better elevation data. In fact, there are already a number of higher resolution NHDPlus projects completed or underway including a LiDAR-based NHDPlus for a watershed in New York. While there is currently no national high resolution NHDPlus production effort planned, if you would like to discuss how the tools might be leveraged to produce high resolution NHDPlus for your area of interest, please contact Tommy Dewald (dewald.tommy@epa.gov) or Cindy McKay (LDM@horizon-systems.com).

Disabling Features from a Network Trace – by Ariel Doumbouya

Have you ever wanted to do a smarter network trace, such as not including coastline features on a downstream trace, or only tracing up specific named streams? This is made easy by using the geometric network in the NHD. Simply add your networked NHDFlowline data to ArcMap and start an edit session on the NHDFlowline workspace. Next, select the feature(s) you do not want to include in your trace. Open the attribute table of the NHDFlowline feature class and scroll to the enabled field. This field is defaulted to Enabled=True (1); this means that all networked features are included in trace functions. Any features that are set to Enabled=False (2), act as a barrier and the trace will stop at that network location. Field calculate the records selected above to 0, this will change their value to False. Close the attribute table and use the Utility Network Analyst Toolbar to drop a flag on the network. Depending on which trace function you choose the trace will stop at any features set to Enabled=False. There is no need to delete and rebuild the geometric network to perform these edits.

Please note: In ArcGIS 9.3 when the field calculate dialog is opened the first time a warning will pop up asking if "you would like to remove undo/redo information for this calculation?" Click No. This is a known issue in ArcGIS 9.3 that has been fixed in ArcGIS 10.

Anomalous Arizona – where did the perennial streams go? – by Keven Roth

A presentation at the Environmental Monitoring and Assessment Program (EMAP) Symposium in Corvallis, OR in May 2002 included statistics used to estimate perennial and non-perennial stream and river length in 12 Western States. The final paper can be found at *http://www.epa.gov/bioiweb1/pdf/EPA-620-R-05-006WesternStreamsandRiversStatisticalSummary.pdf*

The objectives of the study were to estimate the length of perennial and non-perennial streams and rivers, and to evaluate the condition of perennial streams and rivers in States in EPA Regions 8, 9, and 10. The target population of perennial and non-perennial streams and rivers came EPA's River Reach File (RF3).

The study used 1:100,000-scale RF3 data (NHD was not yet available) to choose a number of sites. Each selected site was evaluated in the field to determine perennial and non-perennial status. Overall results showed that 82% of perennial sites agreed in both RF3 and in the field, and 76% of non-perennial sites agreed. That is a fairly good result. However, a state-by-state examination showed Arizona as an outlier. For example, only 23% of the perennial RF3 sites were evaluated as perennial in the field in Arizona, but more than 90% of the sites in Montana were evaluated as perennial. Conversely, none of the Arizona non-perennial RF3 sites was evaluated as perennial in the field.

The study makes the central point that “it is known that RF3 incorrectly codes some stream segments.” While “some” is not specified, the paper goes on to list ten factors that contribute to incorrect coding. The implication is that RF3 data is significantly flawed.

Statistics from this study have been cited in other reports and studies, but the unusual results in Arizona have never been fully explained. When comparing the EMAP selected perennial sites in Arizona to both the medium-res and the high-res NHD, it is obvious that many of the selected perennial sites were in areas of Arizona that have no perennial streams as demonstrated by a comparison of all the gaging stations with flow statistics against the high-res NHD. In fact, out of 170 gages with flow records clearly showing perennial flow, only 10 are associated with streams in the NHD coded as “intermittent”. Nine of those have data problems not related to stream classification, and one is a “borderline” perennial stream based on flow statistics. In all 364 gaging stations were compared to the high-res NHD. Similar comparisons were made for the 160 gages with intermittent flow with only two of the intermittent gages associated with perennial streams in the NHD. Seventeen gages were not used because of limited years of flow records. About 17 gages were classified as "borderline" - they could easily be classified as perennial or intermittent. Most of those were on streams classified as perennial in the NHD.

The examination of the EMAP findings, NHD data, and gaging station data indicate that the NHD correlates much more closely with gage data than does the EMAP evaluation in Arizona.

Indexing NWIS gaging stations to the NHD - by Michael Tinker

Over the last year, the USGS has been adding stream gage and water quality stations to the NHDPointEvent Feature Class. The data source is a snapshot, from May 2011, of 131,902 gaging stations contained in the National Water Information System (NWIS). For each gaging station, the NWIS records a site number, the type of station, flow rate statistics, water quality information, and the latitude and longitude of record. Many NWIS stations have more than ten years of continuous data.

The NHDPointEventFC links each gaging site to the NWIS by its respective site number. The NHDPointEventFC also contains an URL which links the point event directly to the NWIS web site, where all the records associated with this site may be accessed.

When these gaging sites are added to the NHD, they are snapped to NHD flowlines the gage is assumed to measure. Thus, the precise location of the gaging site in the NHDPointEvent may differ from what is contained in the NWIS. While the NWIS records the physical latitude and longitude of record for each site, the NHDPointEventFC locates the event in the linear stream network. This means all the events in the PointEventFC are associated with a NHDFlowline ReachCode and linear Measure.

The NWIS indexing project is now 80% complete. Of the 219 hydrologic subregions in the NHD, 41 subregions remain. The USGS expects to complete the NWIS indexing project in early FY2013. The project status map can viewed at http://nhd.usgs.gov/project_status.html

NHD Photo of the Month

This month's photo was submitted by Kristiana Elite of the USGS. It features St. Mary Lake in Glacier National Park. To see the photo of the month go to ftp://nhdftp.usgs.gov/Hydro_Images/StMaryLake.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.

July Hydrography Quiz / New August Quiz

John Lynam of the Maine Department of Environmental Protection was the first to guess the June NHD Quiz as Flaming Gorge Reservoir on the Wyoming-Utah border. See ftp://nhdftp.usgs.gov/Quiz/Hydrography84.pdf. John is a GIS Analyst in support of the Maine Department of Environmental Protection in Augusta, Maine. He's been working with the agency since 1995, primarily assisting staff with GIS and GPS support on groundwater clean-up sites. John is also the spatial manager for our Environmental and Geographic Analysis Database (EGAD) which contains over 22 million analytical records. The database also includes surface water results which could be linked to NHD. John's GIS data can be found in Google Earth format for anyone to use at the following location: http://www.maine.gov/dep/gis/datamaps/

Others with the correct answer (in order received) were David Asbury, Gerry Daumiller, Steve Shivers, Kitty Kolb, Al Rea, Richard Patton, Steve Aichele, Joe North, Evan Hammer, Joanna Wood, Roger Barlow, David Straub, Barbara Rosenbaum, Ken Koch, Jim Seay, Dave Greenlee, Stephen Daw, Edwin Abbey, Ed Carter, Jim McDonald, John Kosovich, Bob DenOuden, Dave Vincent, Michael Burns, Jim Sherwood, Florence Thompson, Laurie Morgan, Dave Hockman-Wert, Amy Prues, and Tom Denslinger.

This month's hydrography quiz can be found at ftp://nhdftp.usgs.gov/Quiz/Hydrography85.pdf . Name the lake (although in the NHD the name is missing). It's the largest lake in the state. It was formed by damming a river with a name that seems out of place. Send your guess to jdsimley@usgs.gov.

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