

USGS National Hydrography Dataset Newsletter
Vol. 11, No. 3, January, 2012
by Jeff Simley, USGS

Harmonization with Canadian Hydrography by Pete Steeves

The first pass of harmonization with Canadian hydrography is entering the homestretch and should be completed by April 2012. Over 70 Subbasins have been fully integrated along the international border, with the final 20 plus on the near horizon. Some of the trickiest datasets to integrate have been those where water defines the border, including the St Marys River (which connects Lake Superior and Lake Huron), the St Clair and Detroit Rivers (which connect Lake Huron and Lake Erie), the Niagara River (which connects Lake Erie and Lake Ontario), the St Croix River (which flows into the Bay of Fundy), and the Rainy River (separating parts of Minnesota from Ontario). For example, Canada's database did not allow the use of the international border as an artificial flow path, which required novel new approaches to this feature type. The Great Lakes themselves will likely be the final 4 units that get fully harmonized (Lake Michigan is not included as it is fully within the US border). The final announcement of this effort will include more detailed discussion about the unique concepts and processes that went into harmonizing the Great Lakes.

NHD/WBD Stewardship Conference

The fourth bi-annual NHD/WBD Stewardship Conference will be held in New Orleans, Louisiana March 29-30, 2012. It will be held in conjunction with the American Water Resources Association's 2012 Spring Specialty Conference on Geographic Information Systems and Water Resources VI, held March 26-28 in New Orleans at the Sheraton, see <http://www.awra.org/meetings/Spring2012/index.html>. The AWRA conference will focus on applications of GIS in water resources, which involves the NHD and WBD, while the stewardship conference will focus on data stewardship and data maintenance issues. Holding the two conferences together will enable travelers who would normally attend both conferences do so in just one trip. More information on the conference is available from you USGS geospatial liaison. If you have question on the NHD/WBD Stewardship Conference, please contact Jeff Simley at jdsimley@usgs.gov.

Attending the NHD/WBD Stewardship Conference

The stewardship conference will be held all-day Thursday and Friday morning March 29-30, 2012. If you plan to attend the stewardship conference contact your USGS geospatial liaison. If you plan to attend, make hotel reservations as soon as possible. The weekend is the Men's Final Four NCAA Basketball Championship. Hotel rooms are very scarce and very expensive. However, if booking the hotel room through AWRA you can take advantage of 60 rooms set aside for the Stewardship Conference Thursday night at \$149.00. See <http://www.awra.org/meetings/Spring2012/travel.html>. Plan on departing New Orleans Friday afternoon.

Transferring Local Resolution Data into the Multi-resolution Dataset by David Anderson

Over the past several months, the USGS has been in the process of transferring local-resolution NHD features for Vermont to the high-resolution feature classes to support a single multi-resolution dataset and to develop a transfer process for other local-resolution data that exists. The process is conducted mostly using manual methodologies to build the required transaction tables and doing comparisons on both spatial datasets to ensure data does not get lost or fail the QA/QC processes. The NHD Geo-Conflation process could not be used for this process since the data had been conflated in 2004 by the Vermont Center for Geographic Information and reachable features carried their own reachcodes within the local

resolution data. Vermont has been using statewide local resolution data to assign NHD event features, so removing the local-resolution reach codes was not an option.

The NHD repository stores spatial features in different feature classes assigned by resolution. Reach codes for both the high- and local-resolution feature classes are stored within a single table, NHDReachCode_ComID, with the assigned resolution being an attribute. If a reached feature is added to a specific resolution, then that reach must have the correct resolution assigned. So it is not merely a process of moving the geometry to the high-resolution data but also the reach code identifiers that will be included in the multi-resolution data. Features and reach codes that no longer exist are removed from the high-resolution repository.

The maintenance of the spatial geometry is fairly easy. Old high-resolution features were removed and local-resolution features were added as new high-resolution features. However, when features cross subbasin or political boundaries, the features must be edge-matched, merged and modified. Vermont had extended their collection of local-resolution features beyond their state borders, which made this fairly simple. Three states share the border with Vermont. With concurrence from adjacent state stewards, Vermont's local-resolution information was extended to the first confluence or 1-mile, whichever was smaller, into the adjacent state. Not all adjacent stewards were in agreement, so for those not in agreement features were edge matched and modified only to the state borders.

The process also included a large reach migration project as the entire 0201 and 0111 subregions were re-coded to be included in the 0415 subregion. Although the reach migration process had previously been done on the server side, this time the process was done manually on the client side. The goal was to maintain a 1:1 match for reach codes since the physical boundaries had not changed significantly and to investigate those features crossing WBD boundaries to see if they needed a new reach assigned. Association tables were developed for the old and new reachcodes and this in turn was used to develop the reach cross reference table, status table, and assign the new reachcodes to the features in NHDFlowline and NHDWaterbody.

Point Events in the NHD by Michael Tinker

The NHD contains a feature class NHDPointEventFC which contains point events such as dams, diversions, streamgages, and water quality stations. Events in the NHD can reference external data sources to provide more intelligence to The National Map. For example, the Dam point event references the National Inventory of Dams (NID) by way of the Source_FeatureID field. A dam point event in the NHD with a Source_FeatureID of AZ00207 points to a dam in the NID with the same NID ID. By looking up that ID in the NID it is possible for authorized persons to access information maintained about this dam. In this case AZ00207 is Schoens Dam, a 118' rockfill dam built for flood control in Navajo County, Arizona. That data integration helps make The National Map a stronger source of information.

Gaging Station and Water Quality Station (QW) point events also reference external data, in this case the National Water Information System (NWIS). For instance, a QW station with a Source_FeatureID of 08455000 references a corresponding water quality station in the NWIS. Visiting the NWIS website for site number 08455000 accesses the information the NWIS maintains about this site. In this case it's a USGS water quality and gage site on Pinto Creek, near Del Rio, Texas.

The FeatureDetailURL field lists the web address of the external data if one is available. All gaging stations and water quality stations in the NHDPointEventFC have active links to the NWIS web site. If working with point events in ArcMap, use the identify tool to get attributes on a point event, then click the URL listed in the FeatureDetailURL to go directly to NWIS web page for more information about that point.

In the NHDPointEventFC, the EventType field shows the event type for each feature. The NHD model currently has six kinds of point events: gaging stations, dams, general divergences, withdrawing divergence structures, contributing divergence structures, and water quality stations. The addition of point events to the NHD is a work in progress. The USGS is currently adding points from an NWIS snapshot of 131,902 gage and water quality stations. The work should be done by September 30, 2012. Total numbers for each kind of point event are shown in the following table:

Point events in the NHD, January 20, 2012

| Code | EventType | Number |
|------|-----------------------------------|---------|
| 1 | Gaging Station | 43,932 |
| 2 | Dam | 60,259 |
| 3 | General Divergence | 25 |
| 4 | Withdrawing Divergence Structure | 825 |
| 5 | Contributing Divergence Structure | 21 |
| 6 | Water Quality Station | 16,981 |
| | Total | 122,044 |

Linking scientific information as events to the NHD improves its utility. At the same time, the linked scientific information becomes more useful because it is now connected to other events by way of the NHD network. Events connected in a flow network create a synergy between the data and the network. By adding scientific information to the NHD as events, the USGS is improving the utility of the NHD for customers and scientists.

Status update on the integration of the WBD with the NHD by Stephen Daw

The moratorium on edits to the Watershed Boundary Dataset began on December 23, 2011 and is still in effect. All the edits submitted to the WBD have been reviewed by the WBD National Technical Coordinators (WBD NTC) and are being incorporated in to the final version of the WBD held by the Natural Resource Conservation Service (NRCS). Delivery of the final version of the NRCS held WBD will occur the first or second week of February, 2012. This is a little later than planned as there were many updates submitted before the editing moratorium. Also, as all updates have to be reviewed before inclusion in the WBD, there was some delay as some edits were sent back to the states for revision.

Once the NRCS delivers the final version of the WBD to the USGS in Denver, the NRCS will no longer maintain the database of record but will only house a copy of the WBD that is updated periodically. The USGS will begin to load the final WBD data into the new model around mid-February with all data loaded and ready for update around the end of February or early March. Users and stewards of the NHD will begin using the final version of the WBD at that time.

Updates to the WBD will not begin, however until the WBD Edit Tool is released. The WBD Edit Tool development is ongoing. It is expected that beta testing of the tool will happen sometime in February with final release of the WBD Edit Tool happening around the end of March, just in time for the NHD/WBD stewardship conference. A WBD Edit Tool training session is planned for the NHD/WBD stewardship conference on Friday, March 23, at 1:00.

A refresh of the WBD in the NHD using December WBD was just completed this week. This data is more accurate than the WBD that was previously in use since June of 2011. Any questions about the WBD database, the WBD integration with the NHD or about the WBD Edit Tool should be directed to Stephen Daw at sgdaw@usgs.gov.

Possible missing features in extracts along the International borders by David Anderson

Both certified and provisional Hydrologic Units (HU's) are being used along the Canadian border. The hydrologic units are used in the assignment of reach codes to features being brought in from the U.S.-Canada harmonization process, but have also been used to migrate reach codes on the U.S. side of the border. The hydrologic units used are a combination of the U.S. HU-8 units and the Canada HU-4 units. These HU's will be certified, but some around the Great Lakes and eastward are still provisional.

The U.S.-Mexico harmonization also uses provisional HU boundaries. Reach codes have been assigned to polygon features on the Mexico side, but not to flowline features or migrated reaches on the U.S. side.

If a user requests an extract of an HU along the International borders, be aware that the extract may be missing features that do not have a reach codes within the current certified boundaries. If the extract is missing features contact a NHD Point of Contract to obtain a custom extract.

Finding a Feature Using the NHD Feature Catalog by Kathy Isham

The NHD Feature Catalog is a useful document that contains information about NHD features such as information about attributes and feature delineation, data dictionaries, feature examples, and definitions. To get to the feature catalog go to <http://bit.ly/xZ6HzS> or go to the NHD User Guide from the NHD Homepage <http://nhd.usgs.gov>. Click on "User Help" then choose "User Guide" or "Feature Catalog". Once you open the feature catalog there are a few different ways to get to a feature. The easiest way is to use the search bar on the right side of the page. Type "StreamRiver" in the search bar. The results will appear on the left side of the window. Choose the first option for StreamRiver. This will bring you to the feature page. Scroll down past the feature definition and examples and you will see the Fcode list for this feature. If you click on an attribute its definition will pop up. For example, click on "intermittent" in the Fcode table and a definition comes up. To see the feature delineation information click on the link for "Feature Template" and this information will pop up.

Next let's look at a Data Dictionary. To see the NHDFlowline Data Dictionary, click on "contents" in the top left hand corner. Since you were just on the StreamRiver Area page, close the Area folder by clicking the icon next to "Area" in the catalog tree. Click on the Flowline folder, scroll down, and you will see the data dictionary for Flowline. Each NHD feature class has a data dictionary on the main feature class page. The Feature Catalog has been updated to include model changes from Model 2.1 and will be published when the new model is live. For any questions on the NHD User Guide or Feature Catalog, contact Kathy Isham at krisham@usgs.gov.

Marshall Creighton

Marshall Creighton supervised the National Hydrography Dataset section at the Rolla, Missouri Federal Center for approximately four years until his retirement in December, 2011. He possessed a strong passion to learn the NHD model, continually improve the editing process, and meet section goals in a timely manner thus improving data for NHD users. During this time frame Maintenance Lite, Lite II, and Image Integration programs were completed. Also, Marshall led in the continuation of maintenance/revision of NHD data prior to Map Production Services (Graphic Program), Imagery and Elevation Section production schedules. Marshall's vast knowledge, planning, and people skills will be missed. Thank you, Marshall for a job well done.

NHD Photo of the Month by Kathy Isham

This month's photo features Akaka Falls and was submitted by Kathy Isham of the USGS. Akaka Falls is found in Akaka Falls State Park of the Big Island of Hawaii. Akaka falls is on Kolekole stream and falls for 422 feet. In the Hawaiian language, Akaka means to crack, split, or scale (Wikipedia, http://en.wikipedia.org/wiki/Akaka_Falls_State_Park). To see the photo of the month go to ftp://nhdftp.usgs.gov/Hydro_Images/Akaka_Falls.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.

December Hydrography Quiz / New January Quiz

Calvin Meyer was the first to guess the October NHD Quiz as the confluence of the Arkansas and Mississippi Rivers. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography77.pdf>. Calvin notes: "The location is the confluence of the Arkansas and Mississippi Rivers near Beulah, MS. The NHD Area representing the Arkansas River is missing blue polygon fill at its confluence with the Mississippi River, and is shown just with an artificial path. The problem was caused by 2-D Stream/River features for the Arkansas and Mississippi Rivers not being joined at the subbasin boundary in the high resolution NHD. Newer aerial imagery for the area also indicates that the Arkansas River has changed its course, and no longer accurately matches what is being portrayed in the high resolution NHD."

Calvin's current work involves cartographic reviews of feature content of base maps for various scales used in The National Map (TNM) viewer. The National Geospatial Technical Operations Center (NGTOC) is working on merging layers, such as contours, shaded relief, imagery, woodland, and urban tint, to create new cached composite base maps. Other duties include serving as chairperson of the Cartographic Governance Board, which is the final decision-making authority on feature symbology, labels, layout, and other cartographic representation rules as they apply to the US Topo product, TNM Viewer, or other *TNM*-derived cartographic products and services. He also provides service desk support by helping to answer questions and resolve problems for users of TNM viewer.

Others with the correct answer (in order received) were Tom Denslinger, Claire DeVaughan, Barb Rosenbaum, Roger Barlow, Tia Morita, Kitty Kolb, Matt Rehwald, Bernie Sroka, and John Kosovich.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography78.JPG> . Again, this is the confluence of two very significant rivers, this time out west. What confluence is it? 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 Pete Steeves, David Anderson, Michael Tinker, Stephen Daw, Chris Lund, 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.