

USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

River Miles in the United States by Ariel Doumbouya

Have you ever heard the statistic there are 3.5 million miles of rivers in the United States? Where does this number come from? When was this last updated? Most of these statistics reference articles found in Encyclopedia Britannica, Kammerer, J.C., May, 1990 and US Geological Survey Fact Sheet, Open File Report 87-242, "Largest Rivers in the United States," 1990. Well 23 years after the original statistics were published, the NHD team has decided it's time for an update!

As of July 2013 the high resolution NHDFlowline layer of the NHD contains 22,563,838 features. This adds up to an amazing 8,236,370 miles! That is enough to wrap around the earth 330 times! Of that, 7,070,050 miles are designated as single-line Stream/River features while much of the balance is for double-line (polygon) Stream/River features.

The rivers of the nation cover a diverse landscape and sustain our lives by supplying drinking water, irrigating crops, supporting aquatic biodiversity, providing hydropower, and include numerous scenic and recreational treasures. Understanding our water system and surface water network is critical to developing plans to manage, maintain, and preserve our water supply.

Network Improvement Project Status by David Kraemer

A primary goal of the Network Improvement Project is to insure that the high-resolution NHD is ready for NHD Plus. One component of preparing for NHD Plus is to run NHD through Value Added Attribute (VAA) software. There are 32 checks within the VAA software; 16 checks are Severity 1 and these errors must be corrected for NHD Plus. The majority of the remaining checks are Severity 3 and fixing these errors will improve NHD Plus results. During the initial Network Improvement Project all 21 Regions of the high-resolution NHD were checked with the VAA software, then edited, to insure that all Severity 1 and most Severity 3 errors that had occurred within the NHD prior to the spring of 2012 were fixed. NHD Regions 06, 20, and parts of 18 were re-run through the VAA software after their initial Network Improvement edits to insure that NHD Tools were finding all Severity 1 errors. It was determined that there are two Severity 1 checks currently not being done by NHD Tools; Check 19 (Nonlinear Flowline Reach Codes) and Check 27 (Duplicate Waterbody's with the same Reach Code). So to insure the NHD is ready for NHD Plus, the Network Improvement Project has started a Double Check of all 21 NHD Regions to correct these errors and any others introduced into the NHD up through the fall of 2013. Regions 06 and 20 are completed with the Double Check edits and should be ready for NHD Plus.

Any editors of the NHD high-resolution data using the NHD Tools can help insure that the NHD data remains ready for NHD Plus by doing the following for any high-resolution NHD job. For those editing with the Conflation Tools those NHD areas need to be re-checked with NHD Tools to be VAA compliant.

1. Install and use NHD Tools version 6.1 – the only version with all checks needed for NHD Plus
2. Correct all Severity 1 errors in all Initial QC Checks and Final QC Checks
3. Correct Severity 3 errors in all Initial QC and Final QC Checks (Isolated Networks can be skipped)

The current status for the three Network Improvement Project components is:

1. Network Improvement Double Check: Charles Bowker is editing Region 18. Allen Karsh will start editing Region 02 and I will start editing Region 07 after we complete our Alaska edits.
2. Alaska Initial Network Improvement: Allen Karsh and I will complete Sub-Region 1903 before Network Improvement goes dormant in Alaska, while completing the Double Check edits.
3. Uncompleted Initial Network Improvement Sub-Basins outside Alaska Checked-Out by States:
 - a. Florida (03090101 & 03090205)
 - b. Alabama (03160205)
 - c. Indiana (05120111, 05120113, 05120201, 05120202, 05120206, 05140104)
 - d. Louisiana (08040207, 08040302, 08080101, 08090203, 08090302)
 - e. Mississippi (08030202 & 08030207)

As States check-in their jobs the USGS will edit these uncompleted initial Network Improvement Sub-Basins. The initial Network Improvement edits for the Sub-Basins within Regions 01 and 04 along the northern border will commence once the Canadian hydrography is moved to the International Layer.

NHD Update Tool Development Status by Paul Kimsey

The USGS will be releasing a new version of the NHD Update tool in January 2014. The new version (v6.1.0 for ArcGIS 10.1) will include a pre-conflation capability which is the first step in merging the now separate conflation process with the NHD Update tool workflow. NHD Update v6.1.0 also addresses several issues reported by NHD editors who are currently using the 6.0.1 version of the tool.

WBD Status Report by Stephen Daw

What a difference a year makes! In the past 12 months, the WBD moved forward on several fronts.

During 2013, version 1.0 of the WBD Edit tool for ArcGIS 10.1 and 10.0 was released; this was followed by improved versions 1.2, 1.8, and 1.9. In September, version 2.0 of the WBD Edit tool for ArcGIS was released for ArcGIS 10.1 and ArcGIS 10.0. This is by far the most robust, stable version of the tools ever released. The USGS believes this tool is ideally suited for improving the WBD. Special thanks go to Terry Vimont for her excellent work on developing the WBD Edit tool.

Further development of the WBD Edit tool in 2014 focus on an upgrade the WBD Edit tool to work in ArcGIS 10.2. The ArcGIS 10.1 version of the tools will still be maintained, but with the release of the 10.2 tool, the ArcGIS 10.0 version of the WBD Edit tool will no longer be supported. Other improvements planned for next year are additional training job vs. real job handling, one button topology creation and validation, additional functionality in the MOD tool, and starting into creating a feature rich names tool.

Additional tool development will address Add-Ins. Right now the WBD tools consist of (1) the main WBD Edit tool itself and (2) the Add-In tool bar. The main part of the tool allows stewards to Get jobs from USGS, Open jobs, Close jobs, create Metadata, and Submit jobs to the USGS. Also in the main tool are display and validation functionality. It is the intent to keep the main WBD Edit tool simple, with only these few functions. The WBD Edit tool requires administrative privileges to install and the current version of the tools must be uninstalled prior to installation of any upgrades. The Add-In tool bar is the second part of the tools; this tool bar has a button to calculate acres on selected polygons. This is very handy considering WBD jobs are not projected and manually calculating acres can be rather difficult in a geographic projection environment. The other button on the Add-In tool bar is the MOD button that allows for easy placement of mods on selected lines or polygons. The Add-In tool bar is independent of the WBD Edit tool and can be used without installation or administrative privileges. Simply place the tool bar file in a known folder and tell ArcGIS where this Add-In is located. Updates are a snap! Replace

the file and the next time ArcGIS is started, the updates are in place. Also, new developments to the Add-In tool bar won't break any functionality available in the WBD Edit tool. For more information on the Add-In tool bar see the contact information below.

Also in 2013, the editing moratorium on the WBD was lifted and updates to the WBD began to roll in. The USGS is seeing improvements to downstream codes, additions to the borders as part of the Mexico and Canadian harmonization project, costal improvements, and updates to boundaries because of more accurate base data. At the beginning of 2013, the WBD data distributed by USGS was a static snapshot. This snapshot was updated several times over the course of the year and became "live" in September when the moratorium was lifted and a major update along the Great Lakes was rolled out.

Several "WebEx" based training classes on the stewardship process and how to use the tools were given in 2013. More are planned for 2014. If interested in learning the new WBD Edit tool and stewardship process, or in having a refresher course, or to see what's new with the Add-In tool bar or version 2.0 of the WBD tools, contact the USGS. For any questions about the Watershed Boundary Dataset please feel free to contact Stephen Daw. sgdaw@usgs.gov, 303-202-4418.

NHD Cartographic Generalization Part 1 by Ariel Doumbouya, Ellen Finelli, Larry Stanislawski, and Barabara Buttenfield

The National Map is a collaborative effort among the USGS and other Federal, State, and local partners to improve and deliver geospatial information for the Nation. These partners produce data at a variety of scales for multiple purposes. At times these data require generalization to support consistent 1:24,000-scale (24K) representation such as when producing the USTopo series of maps. In this case, when the NHD contains local resolution data, it is generalized to the 24K level of detail using semi-automated generalization tools developed by Larry Stanislawski at the USGS Center of Excellence in Geospatial Information Science (CEGIS) and with simplification tools developed by Barbara Buttenfield at the University of Colorado-Boulder. When generalizing for graphic clarity purposes, such as for the USTopo, the process is known as "cartographic generalization." This is opposed to "hydrologic generalization", which is more concerned with pruning the network into a single-line dendrite drainage.

Cartographic generalization is a four step process. The first step is enrichment; which prepares the NHD data for generalization by calculating a variety of values used in subsequent processes. The tools then prune the hydrographic network based on the stream name and upstream drainage area and target stream density values (derived from enrichment). NHDWaterbody features which fall under a certain size criteria and/or do not meet additional standards are also pruned. Target density values within partitions are calculated from archived/benchmark 24K NHD and applied to achieve the desired partition densities. The NHDFlowline, NHDWaterbody and NHDArea features are simplified based on density partitions. The fourth and final step is validation which compares the original, benchmark and final generalized dataset to calculate line and area correspondence. These values are used to evaluate and validate target pruning and simplification values.

To date, the NHD in eight states has been generalized for USTopo production; New Jersey, Delaware, Mississippi, Vermont, Iowa, Indiana, North Carolina and New York. The USTopo is currently on a three-year update cycle, and because of the dynamic nature of NHD updates, this means cartographic generalization must be re-run on states containing local resolution every three years. Cartographic generalization has been run again for the state of New Jersey and will appear on the latest USTopo maps.

Look for Part 2 in the NHD Newsletter next month to learn why generalization must be re-done, what has changed in the generalization tools over the last 3 years and how the resulting data has changed.

MyUSGS Hydrographic Data Community (HDC) Important Sign-up Changes by David Anderson

In the April and July 2013 NHD Newsletter's, the USGS announced the opening of MyUSGS Hydrographic Data Community (HDC) and released a document called "*MyUSGS First Time Users Guide*" (*MyUSGS First Time Users v2.pdf*), which gave users information about starting up a new MyUSGS Confluence account. Since that time the HDC has added over 300 users to its ranks! Because of this significant growth, the MyUSGS team has requested a different method for adding users.

Previously users would go to the MyUSGS log-in page (<https://my.usgs.gov/confluence/login.action>) and request an account through that page. This action has been stopped because there was no workflow for notifying the site administrators when a request was received and therefore no way to validate requests. The MyUSGS team will not create an account unless the HDC administrators validated the request; therefore it would normally sit unattended until someone was notified.

To address this issue the USGS decided to take another route; users requesting MyUSGS accounts (please include *full name* and *email address* in the request) should direct all correspondence to one of the HDC Administrators:

- David Anderson (NHD, GCT, and general users) – danderson@usgs.gov
- Joel Skalet (NHD, GCT, and general users) – jjskalet@usgs.gov
- Stephen Daw (WBD users) – sgdaw@usgs.gov
- Ariel Doumbouya (HEM users) – atdoubouya@usgs.gov

Once received the HDC administrators will forward the request to the MyUSGS team along with the user groups the person has requested. The MyUSGS team will create the account and will notify the user that a temporary password has been generated for them. Users should check their access and notify the HDC admins of any issues. If you require further information, please contact any of the above HDC administrators.

Alaska Hydro Editing and Workflow Training by Becci Anderson

Please join the Alaska Hydrography Technical Working Group for a free, hands-on training of Alaska's hydrography stewardship model, the [Alaska Hydrography Database \(AK Hydro\)](#). Attendees will gain exposure to the standards and workflows required to participate in the statewide hydrography collaboration, as well as get hands-on experience editing and contributing updates to both AK Hydro and the National Hydrography Dataset (NHD). If you're interested in updating hydrography data in Alaska, then this training is for you! This training is sponsored by the Alaska Hydrography Technical Working Group (AHTWG). For more information about AHTWG, please visit <http://seakgis.alaska.edu/ahtwg/>. The training will be conducted February 3-5, 2014, ADNR TIPS Training Room, Anchorage, AK. For more information about the training or to sign up, please contact Becci Anderson at rdanderson@usgs.gov.

Downloads of NHD Data from the USGS in November

During November there were 10,044 NHD downloads including 7,550 ftp downloads and 2,494 downloads from The National Map viewer. This is broken into 2,684 downloads of statewide high resolution NHD and 191 medium resolution downloads. There were 3,557 subregion-based high resolution downloads and 1,118 medium-resolution downloads. From the National Map Viewer there were 2,160 rectangle extracts of various sizes and 334 by subbasin or county.

2014 AWRA Spring Specialty Conference GIS and Water Resources VIII – Data to Decisions

Geographic Information Systems (GIS) are an indispensable tool in providing timely and accurate information necessary for making excellent water resources decisions. Emerging technologies in data collection, information management, web and cloud services, and visualization have opened up significant new avenues for sharing solutions across local, state, federal, and international levels. Come and discover new solutions for your organization. The conference is May 12-14, 2014 at the Snowbird Resort in Snowbird, UT. See <http://www.awra.org/meetings/SnowBird2014/>

NHD Photo of the Month

This month's photo was submitted by Roger Barlow, and features the Potomac River just downstream of its confluence with the Shenandoah River at Harpers Ferry, West Virginia. See <ftp://nhdftp.usgs.gov/Hydro/Images/HarpersFerry.JPG>. Submit your photo for the NHD Photo of the Month by sending it to kyoder@usgs.gov. This will allow the program to build a library of real-world photos linked to the NHD.

November Hydrography Quiz / New December Quiz

Anji Auger of the Maine Office of GIS was the first to guess the November NHD Quiz as Lake Lanier, in northern Georgia. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography100.jpg>

Anji Auger works for the Maine Office of GIS as a GIS Coordinator. MEGIS provides geospatial data, services and support to users of geospatial technology. She has been involved with the NHD since the early days of conflation and is now the principal steward in Maine for NHD as well as WBD. She works directly with various state agencies and other NHD/WBD users to coordinate enhancing the hydrography data for Maine. She also works with other state and federal agencies when it concerns Maine GIS data.

Others with the correct answer (in order received) were: Evan Hammer, Linda Davis, Jason Piwarski, Keith McFadden, Dan Button, Roger Barlow, Barb Rosenbaum, Dennis Dempsey, Dave Straub, Amy Prues, Rick Kelson, Laurie Morgan, John Kosovich, Ken Koch, Becca Conklin, Jim Sherwood, Steve Shivers, Richard Patton, Mark Sommer, Stephanie Kula, Matt Rehwald, Bernard Sroka, Jon Becker, Joanna Wood, John Griffin, Andrew Suppiger, Russell Almaraz, Geoffrey Chiapella, Tom Denslinger, Janet Kellam, and Mark Naftzger.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography101.jpg>. Where is this meander in the Mississippi 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 Ariel Doumbouya, David Kraemer, Paul Kimsey, Stephen Daw, David Anderson, Becci Anderson, Gary Ott, John Varndell, Kathy Yoder, and Katrina Burke.

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.