

USGS National Hydrography Dataset Newsletter  
Vol. 14, No. 5, March 2015  
by Jeff Simley, USGS

**Hydrography Seminar Series** by Steve Aichele

High-quality hydrographic data are critical to a broad range of government and private applications. Resource management, infrastructure planning, environmental monitoring, fisheries management, and disaster mitigation all depend on up-to-date, accurate, and high-quality hydrographic data.

The U.S. Geological Survey National Geospatial Program is initiating a new series of virtual seminars to highlight the uses of hydrographic data. These seminars are intended to share success stories from users who have solved real world problems using hydrographic data, provide information about the National Hydrography Dataset and related products, and provide a virtual forum for users, similar to what might be encountered in a conference setting. Please feel free to forward this announcement to interested parties.

The first seminar will be held on April 9 at 2:00 PM ET. The topic will be the response to the January 2014 Elk River chemical spill in West Virginia, specifically the use of the NHDPlus, real-time stream flow and velocity information from stream gages and models, and the Incident Command Tool for Drinking Water Protection application to limit effects of the spill on communities downstream.

These seminars will be presented every 6 to 8 weeks, featuring applications and speakers from different disciplines. Connections are limited and pre-registration is required.

**Hydro Seminar 1 – Incident Command Tool for Water**

Guest speaker – Dr. William Samuels, Leidos

Thursday, April 9, 2015 - 2:00 PM Eastern Daylight Time

[Register - https://usgs.webex.com/usgs/j.php?RGID=r8118362e9c3aeb900dde66bf3db8cff3](https://usgs.webex.com/usgs/j.php?RGID=r8118362e9c3aeb900dde66bf3db8cff3)

After your request has been approved, you'll receive instructions for joining the meeting. In case the meeting is full, you will receive information on an alternate date. For more information see:

<http://nhd.usgs.gov/HydrographySeminarSeries.html>

**High Resolution NHDPlus for Hawaii**

High resolution NHDPlus data for Hawaii has been produced by the USEPA. See

[ftp://nhdftp.usgs.gov/Hydro\\_Images/HI\\_NHDPlus\\_Kauai.jpg](ftp://nhdftp.usgs.gov/Hydro_Images/HI_NHDPlus_Kauai.jpg) for an example of the NHDPlus for Kauai.

The line weight of the streams is relative to the flow volume calculated by the Enhanced Run-Off Method technique. Note the radial drainage pattern. Also notice the famous Waimea Canyon in the west.

**Partnership Funding** by Al Rea

As in past years, the National Geospatial Program is seeking partnership proposals for projects that build and strengthen stewardship and that improve, enhance, or expand the NHD, WBD, and related datasets.

Priorities include:

- expanding or improving stewardship for states/territories in which stewardship activity has been lacking or has stalled
- training on the stewardship tools
- building value in the hydrography data through:
  - Data quality Improvements at current scale

- Improvements to the scale/resolution/level of detail as compared to current NHD, using lidar or other means
- Event data referenced to NHD, particularly those that affect the network framework, connectivity or flows

Proposals should be coordinated with and submitted through your USGS National Map Liaison. Contact [your liaison](#) for additional details. Proposals are due by May 30, but “sooner the better.”

### **Update on Hydrography Requirements and Benefits Study** by Steve Aichele

The Hydrography Requirements and Benefits Study is supported by the USGS National Geospatial Program, the USGS Water Mission Area, and the Natural Resources Conservation Service to understand user needs, and the value of meeting those needs. This study follows the same approach as the National Enhanced Elevation Assessment (NEEA) in 2011, which led to the new 3D Elevation Program (3DEP). The first phase of the effort, a online survey to users across Federal, State, county, local, tribal, academic, and non-profit sectors was recently completed. Over 200 responses were gathered from 23 Federal agencies, and over 250 responses were gathered that included representation from all 50 states.

The key components of the survey included 1) identifying Mission Critical Activities (MCA) that rely on hydrography data; 2) identifying the functional requirements (data content, analysis tools, currency, interoperability, and geography) necessary to support the MCA, and 3) estimating the operational and societal benefits of having those requirements met. Multiple users within an agency or State filled out the survey, and each survey respondent was able to enter up to five MCAs. The next study phase will be to work with agency and state points of contact to consolidate and validate the responses into agency and state level summaries.

Similar to the NEEA process, these consolidated and validated responses will be published in a report this fall, and will be used to chart the course for the hydrography program going forward.

### **National Snapshot of NHD Available** by Al Rea

A national snapshot of the entire High Resolution NHD from February, 2015 is now available in a file geodatabase. Anyone is welcome to give it a try and give us feedback. It is a large download (10 GB), and we advise using an ftp client such as [FileZilla](#), which allows you to resume a transfer in case of a failure. This file geodatabase includes just the basic NHD feature classes and tables in a slightly modified data model. It is available for download at [ftp://hdftp.cr.usgs.gov/Custom/NHD\\_All\\_Feb\\_2015.zip](ftp://hdftp.cr.usgs.gov/Custom/NHD_All_Feb_2015.zip). Note the USGS does not currently provide a national snapshot such as this on a regular basis. Please provide feedback via email to [ahrea@usgs.gov](mailto:ahrea@usgs.gov) on whether this type of national database would be useful to you, in addition to the current subregion (4-digit HUC), subbasin (8-digit HUC), and state downloads.

### **NHD in Washington State** by Anita Stohr

Washington State adopted the NHD as its standard hydrography dataset in January 2011. Since that time the state has focused on associating the highest priority water resources, human health, and fisheries datasets to the NHD, correcting the largest errors in linework, and providing access to a variety of users. Washington regularly releases a version of NHD in state plane coordinates and that contains stream order as an attribute on the NHDFlowline. The following is the status report was released to users with the February 2015 update:

This release of the NHD is intended to be the static annual release that can be used by agencies to update their own NHD event data and web applications. There may be additional releases during the year, but

they would be posted along with the February 2015 version which will remain available on our web site until next February, 2016. <http://www.ecy.wa.gov/services/gis/data/inlandWaters/nhd/NHDdownload.htm>  
Changes that occurred since the last update in June 2014.

- An ArcGIS online web map containing 5 services is available. <http://bit.ly/1wcsll4>. The services were published separately to allow users to have flexibility in creating their own maps. These are: NHD\_Hydro\_Cache, NHD\_Label\_Cache, and NHD\_WBD\_HUC4, NHD\_WBD\_HUC8 and NHD\_WBD\_HUC12 feature services
- Lakes associated with Dams: Our project to locate all Washington State Dams on the NHD has been completed. In the process, many lakes needed to be updated. Hazard Category 1 and 2 Dams are part of the distribution dataset in the NHDPointEventFC
- Water Rights diversions: 35,000 of these were located on the NHD. The largest of these are being uploaded to the NHDPointEventFC. The complete set can be downloaded from the Ecology web site <http://www.ecy.wa.gov/services/gis/data/data.htm>.
- All NHD edit requests in our backlog were addressed during July-December; many of these were related to location of water quality monitoring stations. The Toutle River associated with the Mt St. Helens volcano and the Yakima River were also updated.
- The Elwha Dam, Glines Canyon Dam and associated Lakes have been changed to reflect post-dam removal hydrography as displayed on the 2013 NAIP imagery.
- The Washington Department of Fish and Wildlife (WDFW) and the Northwest Indian Fisheries Commission (NWIFC) completed mapping their Anadromous Fish Distribution on the NHD. The Statewide Integrated Fish Distribution is being distributed two ways.
  - SWIFD. The primary distribution dataset has been dissolved on a whole stream identifier (LLID) so that Reachcode is not included, although the geometry is NHD.
  - SWIFD\_RC. Retains attribute fields for NHDReachcode, FromMeasure, and ToMeasure to allow use as a linear event feature class
- Stream Order has been completely rerun and is an attribute on the NHDFlowline. Washington and Oregon cooperated on this effort and a file has been sent to National NHD to update the VAA tables in the master database.
- Updates are all occurring using orthoimagery of one meter or better, and /or lidar of two meters or better. The NHD is a mixed-scale dataset ranging from a scale of 1:24K to 1:4800.

Future work : Local County Government and ESRI Data Collector field verification of NHD

- For the next six months, our focus will be on working with counties to improve the NHD especially in the irrigated areas of Whatcom, Skagit, Kittitas and Clallam Counties. Grant funding for improving NHD linework in counties has been received. We are trying to figure out some logical workflows to improve NHD when local governments have better, hydrography, lidar, or photography.
- We are also piloting use of ESRI Data Collector to field verify NHD flow direction and to distinguish between stream river and canal ditch.

**WBD Status Report** by Stephen Daw

The USGS is still working with the 10.0 and 10.1 versions of the WBD ArcGIS edit tool. These versions of the WBD ArcGIS edit tool are two years old now and continue to perform flawlessly.

The development team is working now on a release of the software for ArcGIS 10.2.2. This release is ready for external testing; however, that testing is on hold while the backend database and website are upgraded and tested. External testing of the WBD ArcGIS 10.2.2 edit tools will begin when the database and website upgrades are ready and final release will follow shortly thereafter. The main component of this release is the fact that it will work in ArcGIS 10.2.2. Minor bug fixes have been addressed, but no enhancements to the tool are going to be implemented. This release is now more important due to the

reported security vulnerabilities with ArcGIS 10.0, ArcGIS 10.1 and ArcGIS 10.2x (MSXML Vulnerability).

Behind the scenes, the ArcGIS 10.2.2 version of the WBD Edit tool will support NGTOC's backend database migration to ArcSDE 10.1. The new tool will support ArcSDE 9.3.1 until the upgrade in databases is made. It should be noted that once the upgrade in database/services is made at the USGS, the WBD Edit tools for ArcGIS 10.0 and ArcGIS 10.1 will still support ArcGIS 9.3.1 job editing/checkins but will not support ArcGIS 10.1 checkouts. The WBD tools for ArcGIS 10.2.2 will support the completion and submission of ArcGIS 9.3.1 jobs as well as checkouts/checkins of ArcGIS 10.1 jobs. Issues: Some users have reported difficulty submitting completed jobs to USGS for National Quality Control (NQC). The reason for this is a heightened awareness of possible cyber threats to USGS and Department of the Interior networks and computers. All incoming data must pass through appropriate security measures before it can arrive on the WBD FTP server. Because of this needed security, failed jobs may need to be resubmitted in order to get through. The best and easiest way to resolve this is to check out smaller areas to work on. Large jobs are particularly prone to failure. Please contact Stephen Daw through the Hydrographic Data Community to report posting issues.

National Seamless WBD: The most current national seamless WBD posted on the prestaged ftp site (<ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/WBD/>) is dated March 9th. There are some problems with this dataset as the USGS has found several duplicate polygons. Many of the problems occurred when we undertook to edit the WBD outside of the normal editing process. Users will notice that most of the duplicate HU's are along the Alaska-Canadian border or around the Great Lakes. In both instances, we undertook projects to delete and replace whole areas within the WBD. As with any process that is run outside approved parameters, some errors entered the WBD. The USGS is working to get those problems fixed. It should be noted, that while duplicate HU's are indeed errors, there is no substantive loss of data in the WBD or loss of crucial information. The WBD is sound, current and accurate. Thanks to the many stewards who work so hard to keep this data current.

The WBD & Conflation Technical Exchange Meeting (TEM) calls will be switched in April. Conflation will hold their TEM call on Wednesday, April 8 while WBD will hold their TEM call on Wednesday April 22nd. Please contact David Anderson ([danderson@usgs.gov](mailto:danderson@usgs.gov)) or Stephen Daw ([sgdaw@usgs.gov](mailto:sgdaw@usgs.gov)) if you have any further questions.

### **Esri's Living Atlas** by Caitlin Scopel

One of the most common hurdles when starting your GIS project is finding appropriate and trustworthy data to use in your GIS analysis. Of course, the National Hydrography Dataset from the USGS is *the* go-to data source for water resources in the United States, but what if your GIS analysis calls for hydric soils, critical habitat, population density, landcover, roads, historic sites, imagery, or other data layers that you know exist, but aren't sure where to find or how reliable they are? Esri's Living Atlas is a curated subset of ArcGIS Online Content comprised of authoritative maps, map layers, and analytic models on thousands of topics. They are from trusted sources and deliver high quality data appropriate to use in your GIS analysis. Every item in the Living Atlas is "ready-to-use," which means it displays clean, authoritative data with high quality cartography and documentation, making the data easy to find, easy to understand, and thus ready to use. It provides an excellent option for many people needing to make maps or perform analysis. Currently, the NHDPlusV2.1 is featured in the Living Atlas, and coming in May, the NHD High Resolution dataset and the Watershed Boundary Dataset will be included as map and feature services within the Landscape section of the Atlas. The landscape section includes an extract data tool, which allows you to download portions of map services, or directly clip the feature services to calculate statistics or enrich with data local to your computer or from other layers found within the Atlas. To browse the Living Atlas, go to [www.arcgis.com/features/maps](http://www.arcgis.com/features/maps) and click on any of the 10 themes:

Imagery, Basemaps, Demographics & Lifestyle, Boundaries & Places, Landscape, Community Maps, Transportation, Urban Systems, Earth Observations, and Historic Maps. For more information about the Living Atlas, please see the Living Atlas Discussion Group on GeoNet, <https://geonet.esri.com/>.

### **Updated Confluence host software on MyUSGS by David Anderson**

The Hydrographic Data Community, designed to support data stewards in the maintenance of the NHD and WBD, is hosted through MyUSGS. MyUSGS has recently updated the Confluence software to version 5.5 from version 4.5. There were several changes in the layout of menu items and appearance. Several are at the space administrator level and do not effect normal users of the HDC. Here are a few of the user significant highlights:

- Users can go to recently visited spaces by selecting the “*Spaces*” drop down.
- The top page toolbar has been reordered and users can directly access *Calendars* and *People* (personal sites) directly.
- User can ‘*Browse*’ all blogs created in the space by selecting “Blogs” under the ‘*Browse*’ dropdown.
- A new button is now included in the pages to “Watch” content. By selecting ‘*Watch*’ users can watch the page contents or the space (page and all attached child pages).
- Users can provide a ‘*Status*’ to other users following them. Go to your ‘*Profile*’ or ‘*Settings*’ and the ‘*Network*’ tab to find out who is following you and follow others in the MyUSGS community.

The multiple changes have required Partner Support to pull the “*Navigating the Confluence!*” document and start a rewrite of the necessary sections. This document will be reposted as soon as it is completed.

### **Addressing Software Security Vulnerability by Ariel Doumbouya**

A potential security risk involves Microsoft XML Core Services 4 (MSXML4). The USGS is addressing this vulnerability which was identified in the fall of 2014. This vulnerability is rated as a high severity vulnerability strictly because the code has been at end of life since April 12, 2014, as reported by Microsoft. This issue is limited to ArcGIS Desktop. Other ESRI products, including ArcGIS Server, are not affected. All current versions of ArcGIS Desktop (up to and including 10.3) require MSXML4. Testing revealed that if administrators removed MSXML4 from the system, and installed MSXML6 in its place, ArcGIS Desktop would restore MSXML4. ESRI support has logged this issue (BUG-000082328).

Esri has provided a patched version of 10.2.2 to USGS Enterprise GIS (EGIS), which was delivered to USGS EGIS on March 6, 2015. This patch will be tested by the Vector Desktop team to assess the impact to ArcGIS 10.2.2 vector desktop tools. Once we understand the impact (if any) the will plan how to proceed from there and share this information with the user community. Due to the MSXML4 vulnerability in 10.3, USGS EGIS will not support a general release package for 10.3. Esri will address the vulnerability with the 10.3.1 release (scheduled for Q2 2015). EGIS will release and support a package for 10.3.1 at that time.

### **March 2015 Status Report for NHD Network Improvement Project by Cynthia Ritmiller**

#### Initial Phase Network Improvement – Remaining

Hydrologic Region 19 (Alaska) is being completed by the USGS as part of the Hydrographic Image Update project using the 2012 Horizon Systems QA/QC check results.

#### Initial Network Improvement Hydrologic Regions Completed:

01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, and 22.

### Double Check Phase Network Improvement- Status

- Region 01- Clean up the few subbasins which have not passed the QA\QC checks. Most of the work is in sub-regions 0105 and 0108. Some of Sub-Region 0108 has about 1,500 lakes without reach codes and these Sub-Basins will need to wait for a new tool update before assigning.
- Region 02- New pre-staged Sub-Regions were received. QA/QC checks were run and subbasins are ready to assign.
- Region 03-Sub-regions 0308-0318 have been through QAQC checks. Will complete these edits working with partners schedules.
- Region 04- Completing edits and should have the region finished within the next few weeks.
- Region 05- Reviewing sub-regions 0512 and 0514, only a few sub-basins remain.
- Region 06- Data was provided to the NHDPlus contractor Horizon Systems in January. This data was required for testing of their system and a final QC before HR NHDPlus will be created. The data was reviewed, and edits were completed in subregion 0601 and 0604 were completed. Once new pre-staged Sub-Regions are received the QA/QC checks will be ran and another copy of data will be sent to Horizon Systems for the creating of HR NHDPlus within this region.
- Region 07- Completed double check phase in May
- Region 08- Needs to go through the Double Check phase. Before starting the Region the POC in the area will be contacted.
- Region 09- Completed double check phase in September
- Region 10- Completing double checks with only a few subbasins remain.
- Region 11- Completing double checks. Sub-region 1101 is finished.
- Region 12- QA/QC checks are being reviewed. Once complete these will go through QA\QC checks and then be passed on to Horizon Systems for the production of HR NHDPlus.
- Region 13- Completed double check phase in July
- Region 14- Completed double check phase
- Region 15- Completed double check phase in September
- Region 16 (Great Basin) is almost complete only 3 subbasins remain. Edits will be completed by Catlin Reusch-Zess.
- Region 17- Needs to go through the Double Check phase. Before starting a Region the POC in the area will be contacted.
- Region 18- Completed double check phase in May
- Region 19 (Alaska)- Initial Phase Network Improvement in progress see above.
- Region 20- Completed double check phase in August
- Region 21- Completed double check phase in August
- Region 22 (Pacific Islands)- Sub-regions were re ran through EPA QA/QC check based on the results. Sub-Basin 22010000 was reviewed and fixed.

Note: Regions will be edited as per the NHDPlus contract schedule. Before starting a Region the USGS Point Of Contact will be contacted.

### **The Network Value Added Attribute of the Month** by Jeff Simley and Cindy McKay

Do you know your VAA's? This NHD Newsletter article is the fourteenth in a series to describe each of the Network Value Added Attributes. The flow network embedded in the NHD is what gives the NHD its analytic power. The Network VAA's boost this power by pre-calculating a number of network characteristics to make network analysis richer and easier to exploit. This month will examine UpLevelPathID and DnLevelPathID.

Recall that LevelPathID is a nationally unique identifier assigned to the set of flowlines that compose a stream from its headwater to its mouth (i.e. where it flows into a path of a lower stream level or where the network terminates). So the Mississippi has a unique LevelPathID, the Ohio has a unique LevelPathID,

the Tennessee has a unique LevelPathID, etc. The value of LevelPathID comes from the hydrologic sequence number (Hydroseq) of the most downstream flowline.

For a particular flowline, the UpLevelPathID and DnLevelPathID tell you, respectively, the LevelPathID of the immediately upstream main path flowline, and the LevelPathID of the immediately downstream main path flowline.

If you're on a minor path and looking upstream when you're sitting on the divergent flowline (i.e. Divergence=2), then the UpLevelPathID will be equal to the mainpath LevelPathID and will be different from the one you are sitting on.

If you're proceeding downstream from anywhere, when you get to the bottom of the LevelPathID (i.e. the mouth of the stream path), then the DnLevelPathID will be the LevelPathID of the mainpath downstream and will be different from the one you are sitting on.

Notes: (1) The LevelPathID is not the same as GNIS\_ID on named streams. (2) The same LevelPathID is assigned to the path followed when you follow the StreamLevel. For example, if the East Branch Black River and West Branch Black River converge and form the Black River, either the East Branch or the West Branch will have the same StreamLevel, and same LevelPathID, as the Black River.

### **NHD Downloads for February**

A total of 18,588 NHD datasets were downloaded from the USGS in February. There are two ways to download NHD datasets. One is from the National Map Viewer <http://viewer.nationalmap.gov/viewer/>. During February, 9,605 NHD datasets were downloaded from this site. The other download method is from the NHD FTP site <ftp://nhdftp.usgs.gov/DataSets/Staged/SubRegions/>. During February 8,983 NHD datasets were downloaded from this site. For the FTP data, 5,853 statewide high resolution files and 345 statewide medium resolution files were downloaded. By subregion, 1,994 high resolution files and 791 medium resolution files were downloaded.

### **NHD Photo of the Month**

This month's photo is by John Todesco. See [ftp://nhdftp.usgs.gov/Hydro\\_Images/Ingram\\_Falls.JPG](ftp://nhdftp.usgs.gov/Hydro_Images/Ingram_Falls.JPG). This is Ingram Falls along Ingram Creek found on the Ironton, Colorado 1:24,000-scale US Topo map. Submit your photo for the NHD Photo of the Month by sending it to [jdsimley@usgs.gov](mailto:jdsimley@usgs.gov).

### **February Hydrography Quiz / New March Quiz**

Amy Prues was the first to correctly guess the February NHD quiz as the bend in the Ohio River on the Kentucky/Indiana border, near Leavenworth, Kentucky, just east of the Hoosier National Forest. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography115.jpg>. Amy is a GIS Specialist with Dynamac Corporation in Cincinnati, Ohio, working as an on-site contractor for the U.S. EPA. Her current projects involve watershed characterization studies, Green Infrastructure in Health Impact Assessments (HIAs), urban soils research and a lot of database design and development. She is a life-long Ohioan who has worked on many GIS projects in Ohio and Kentucky. Thus, as soon as she saw the quiz image she recognized the Ohio River.

Others with the correct answer (in order received) were: Gerry Daumiller, Daniel Button, Stephanie Kula, Jim Seay, David Straub, Barb Rosenbaum, Roger Barlow, Steve Shivers, Joanna Wood, John Kosovich, Matt Rehwald, Joe McGarry, Irv Goldblatt, Kevin Amick, Susan Cohn, Steve Aichele, Evan Hammer, Janet Kellam, and David Hockman-Wert.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography116.jpg>. This is an example of high resolution NHDPlus. Where is it. It can only be in one state. Send your guess to [jdsimley@usgs.gov](mailto:jdsimley@usgs.gov).

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

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The NHD Newsletter is published monthly. Get on the mailing list by contacting [jdsimley@usgs.gov](mailto:jdsimley@usgs.gov).

You can view past NHD Newsletters at [http://nhd.usgs.gov/newsletter\\_list.html](http://nhd.usgs.gov/newsletter_list.html)

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