

USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

New NHD Products and Download Client by Rob Dollison

A number of important changes are taking place related to the delivery of NHD products: 1) new updated staged files; 2) a new Download Client; 3) the FTP site location is moving; 4) 9.3 File GeoDatabase format is going to be retired in December and; 5) Public facing dynamic download will be retired. The new staged files and Download Client are designed to provide faster, more reliable and larger quantities of data to the NHD Community.

The Updated NHD Files

As of September 1, 2015 the pre-staged products have undergone an update that removes the differences previously mentioned ([Nov 2014 NHD newsletter](#)) between these delivered products and what were then called legacy products. The products currently made available through The National Map Download (legacy and new viewers) and the new FTP site (rockyftp) are now the same in content as what is found on the NHD FTP site (nhdftp) for [States](#) and [Subregions](#). We plan on updating HU4 and HU8 files on a bi-weekly basis and the State files monthly starting in November. We are working on change-driven updates in the future.

The New Download Client

In conjunction with these product changes we are encouraging users to take advantage of our new [TNM Download client](#). This client will be taking the place of the older TNM & NHD Viewers for downloading staged products. It allows the user to select a particular hydrologic unit and filter results by the desired format to give users more appropriate results. A [How to Download NHD Data](#) tutorial has been created to help new users take advantage of the new capabilities and will be posted on the NHD site in September.

The basic NHD download steps are as follows: 1) Zoom to your area of interest (AOI); 2) Select NHD file format and product (HU8, HU4, or State); 3) Click on the HU (or State) in the map pane and then, 4) click on Find Product. You will then be presented with the file to directly download or add to a cart if you want to add additional products.

You can order multiple National Map products from this client but we suggest that it is easiest to go through the steps for each product line you want to order, one product at a time. If you are downloading lots of data files it is best to add them to the 'Cart' and then view the cart to take advantage of our bulk download capabilities. From the cart you can export all the files into a CSV file and use the 'Download Manager' Tool' for fast behind the scenes data retrieval while you work away at other activities.

The FTP site is moving

By the end of December we will be transitioned from download of data from the NHD FTP site (<ftp://nhdftp.usgs.gov>) to the Rocky FTP (<ftp://rockyftp.cr.usgs.gov/vdelivery/Datasets/Staged/Hydro/>). This will help to avoid the confusion of having two locations for the same data. Later in 2016 these products will be moved to the Amazon Cloud which will improve reliability and potential download speeds.

One area on which feedback is needed prior to moving to the cloud would be to understand any needs or dependencies on FTP protocol as a download mechanism. The Amazon s3 storage capability provides the ability to browse folders similar to FTP so users can directly find the products they desire but the USGS

is unsure if anyone has FTP protocol requirements, as opposed to HTTP, that should be considered in this migration.

File Format 9.3.1 File GDB is being retired

After December 2015 9.3.1 File GDB format option will no longer be available for NHD or other National Map vector products. To meet security requirements, we will uninstall 9.3.1 from all USGS systems, and we will no longer update the 9.3 files after September 30, 2015.

NHD Dynamic Downloads

The National Map/NHD Viewer download capability will not be available after December. This will also be the sunset of the public facing custom dynamic NHD download. Stewards will still be able to get dynamic check-outs from the stewardship site.

If you are specifically aware of FTP, 9.3.1 FGDB, or additional dependencies or have any other questions or feedback regarding any of these changes please direct them to tnm_help@usgs.gov.

High Resolution NHDPlus Status by Ellen Finelli

The U.S. Geological Survey is producing NHDPlus using the “high resolution” NHD data. This is data represented at a nominal 1:24,000-scale, and does contain pockets of data at 1:5,000-scale and larger. The “Plus” in NHDPlus refers to data that has been integrated with elevation data and many new analytical capabilities are available as a result including estimated stream flow. To produce this, the USGS has contracted with Horizon Systems to create the High Resolution NHDPlus data and at the same time update the NHDPlus production tools to make them more streamlined. Together, Horizon Systems and the USGS, have updated the well-proven medium-resolution NHDPlus production process for high resolution production. Horizon Systems has updated the vector processing steps and created a new user interface integrating updated raster processing steps. The initial code delivery and validation process is ongoing. A validation team at the USGS is now validating the hydrography for Region 06 (Tennessee Basin) for initial production. Six hydrologic regions (01, 02, 06, 12, 14, & 15) will be produced via the current phase of the contract after successful data validation.

Immediately following initial high resolution NHDPlus production, USGS anticipates a quality control (QC) process driving a NHDPlus “refresh” activity. The NHDPlus calculates many highly significant data elements that must be correct to make the data credible. It is easily possible for some of these elements to need refinement. The QC process will be based on review from subject matter experts. The QC team may include members from: the NHDPlus development team, hydrology experts, biology experts, NHD & WBD editors, data stewards, and data users. If you would like to participate in these reviews, please contact Ellen Finelli (elfinelli@usgs.gov) or Al Rea (ahrea@usgs.gov).

Spatial Water Data Subcommittee and the Open Water Data Initiative (OWDI) by Al Rea

The Advisory Committee on Water Information (ACWI) and the Federal Geographic Data Committee (FGDC) created the Subcommittee on Spatial Water Data (SSWD) to assist coordination of Federal and non-Federal interests in spatial water data, including (1) facilitating the exchange of information and transfer of data; (2) establishing and implementing standards for quality, content, and transferability; and (3) coordinating the identification of requirements and the collection of spatial data to minimize duplication of effort where practicable and economical.

The Subcommittee on Spatial Water Data has been leading efforts to engage the community and to design and scope the Open Water Data Initiative (OWDI). The OWDI was launched by the FGDC and the ACWI in the summer of 2014. The goal of the OWDI is to bring currently fragmented water information into a connected, national water data framework by leveraging existing systems, infrastructure and tools to underpin innovation, modeling, data sharing, and solution development.

The Open Water Data Initiative can be envisioned as four primary types of activities contributing to development of an “Open Water Web:” (1) Development of a water data catalog; (2) Serving water data via the Internet in machine-readable formats; (3) Enriching water data through spatial analysis and modeling; and (4) Fostering a community or “marketplace” through which tools, best practices, and data are shared.

The subcommittee is exploring three initial use cases, which help to identify critical data needs, then facilitating and making the needed datasets openly available as web services and downloads. The initial use cases were chosen to cover important societal needs and to address several diverse facets of the water information infrastructure. Additional use cases may be explored in the future. The three initial use cases are:

- **FLOODING**—The National Flood Interoperability Experiment (NFIE) is a joint effort between the National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS), USGS, the U.S. Army Corps of Engineers (USACE), the Federal Emergency Management Agency, (FEMA), the academic community, and commercial partners. The goal of NFIE is to demonstrate a transformational suite of science and services for the next generation of national flood hydrology and emergency response.
- **DROUGHT**—The OWDI drought use case is aimed at providing an integrated picture of water supply and drought information sources, and emphasizes integration and visualization of information from disparate sources.
- **SPILL RESPONSE**—The goal of the OWDI spill response use case is to identify datasets, tools and environmental parameters that would enable web-based predictive modeling of the path and travel-time of contaminants as they travel downstream.

OWDI Progress:

Much progress has been made in the past year on OWDI. Here are a few highlights:

- Outstanding engagement and participation in the SSWD
- Special OWDI tracks at AWRA national conferences in 2014 and 2015
- OWDI featured paper collection in work for JAWRA (Journal of the AWRA)
- NFIE featured paper collection planned for JAWRA
- National NHDPlus with “flattened” data model developed based on user feedback
- USGS gages and NWS forecast points linked to NHDPlus
- OGC and ESRI web services developed for NHDPlus, streamgages

Next Steps:

While much progress on the OWDI has been made, much remains to be done. Here are a few areas on which the SSWD will focus in the next year:

- Development of a linked data catalog, complete with upstream/downstream data discovery capabilities
- Development and documentation of data quality descriptive information best practices
- Continued efforts to identify critical data needs and facilitate making them accessible and interoperable

- Further development of the community, including a wiki, open source repository, and other web-based community engagement activities

NHD Update Tool Status by Hank Nelson

The NHD Update tool v6.2.0 for ArcGIS 10.2.2 is now in a “soft release” which will end early September, 2015. The soft release is an internal only release to not only test the new tool but also to test the upgrade of the NHD server and services to 10.1. Once all issues from testing have been addressed, an external release will follow.

The 6.2.0 version is compatible with both ArcGIS 9.3.1 replicate checkouts (jobs) and ArcGIS 10.1 replicate checkouts (jobs). This will allow editors to complete 9.3.1 checkouts with the new tool and checkout new 10.1 jobs. Starting on the date of external release, no new 9.3.1 checkouts will be allowed and editors will have approximately 30 days to submit 9.3.1 checkouts to USGS.

The 10x migration information has been blogged on MyUSGS, Confluence, Hydrographic Data Community (HDC) and will be updated as changes occur.

Migration of USGS NHD 9.3.1 (ESRI) framework to a 10.x (ESRI) Framework by Paul Kimsey

The USGS currently stores the NHD dataset using Esri 9.3.1 framework. The USGS is now in the process of upgrading to the Esri 10.x framework. Parallel to the need to keep up with the latest releases, the USGS has a September 30 deadline for all ArcGIS Desktops licenses to be upgraded to 10.2.2 or later. This mandate from Department of the Interior is the key reason for stopping support of 9.3.1 checkouts. For these reasons, there is a tight schedule to get this task in place within the month of September. This involves more than just moving the database to a newer release, it also requires supporting applications, services, and most important, desktop tools to support the 10.x file-geodatabase. The USGS is currently testing these capabilities internally. A date has now been set for upgrade of external users. That change will be the “External Release” date. When the USGS goes to an external release, the overall plan is to have users request new 10.x NHD/WBD jobs (file-geodatabase) from the new framework, but continue to support any existing/current jobs (previous checkouts). This 9.3.1 backwards compatible support will go on for a very short-time after our External Release date. The USGS will then ask all stewards to close out existing 9.3.1 jobs and submit those to USGS.

Current Proposed Schedule to meet DOI mandate to discontinue use of ESRI 9.3.1:

(Unforeseen issues may require adjusting the schedule. Please see the HDC Blog for latest changes):

- 09/09/2015 - Last day to request a 9.3.1 Job. The 9.3.1 Stewardship website will not allow future checkouts. It is expected that NHD Update, NHD GeoConflation and WBD Tools will be released to the stewardship community (HEM tool for ArcGIS 10.2.2 has been released).
- 09/10/2015 - External Release date - New stewardship web site will be available (partners can request 10.x jobs). Please visit the HDC Blog for the new URL.
- 9/16/2015 – Final Date for WBD stewards to submit 9.3.1 jobs for NQC. (Last day for WBD stewards to submit 9.3.1 jobs for NQC unless other arrangements have been made with the WBD National Technical Coordinators)
- 09/20/2015 – First Reminder for NHD stewards to QC/submit any active 9.3.1 Jobs
- 09/24/2015 – Final Reminder for submitting all NHD 9.3.1 Jobs
- 09/26/2015 - COB no more NHD/WBD 9.3.1 jobs can be submitted to USGS (all 9.3.1 edits submitted after this date will be lost).

Things that will change on/after the “External Release” date:

- New URL to get access to the 10.x framework stewardship sites, current 9.3.1 web site will be available for reference only
- Only 10.x File GDB will be supported (No new personal GDB jobs)
- NHD Update Tool - release v6.2.0.x (ArcGIS 10.2.2) or later can be used against a new 10.x Jobs (or existing 9.3.1 jobs)
- HEM Tool – Currently available release v2.7.2 (ArcGIS 10.2.2) or later can be used against a new 10.x Jobs (or existing 9.3.1 jobs)
- NHDGeoConflation Tool - release v2.1.x or later can be used against a new 10.x Jobs (or existing 9.3.1 jobs) (testing) 10.x file-GDB templates will be released once delivery goes to 10.x Jobs - via the MyUSGS HDC GeoConflation community.
- WBD Update Tool - release v2.2.0.x (ArcGIS 10.2.2) or later can be used against a new 10.x Jobs (or existing 9.3.1 jobs) (testing)
- NHD Utilities – Currently available release v2.x (ArcGIS 10.2.2) or later can be used against a new 10.x Jobs (or existing 9.3.1 jobs)
- Previous tools only support ESRI 9.3.1 personal geodatabase and should not be used after the 9.3.1 last submission date.

Note: NHD Conflation Tools are subject to later release date than the other tools. As soon as we know the impacts or schedule, we will update our HDC Blog.

Fixing Stream Classification Errors by Keven Roth

The USGS is in the process of determining a fix to stream classification errors in the arid West. In the April NHD Newsletter, a proposal was discussed to reclassify unnamed intermittent streams in the arid west to ephemeral. Since then the proposal has been discussed with many of the stewards and users who would be affected. Also, there has been significant validation of the plan by comparing the NHDPlus EROM flow volume estimates to the NHD high resolution classification and by researching original field notes. The BLM in Idaho and the USFS in New Mexico independently have revised the NHD over specific project areas, based on field work and local knowledge. Their revisions are comparable to those that would be made using the “named” stream approach. The BLM and others in Region 14 (Upper Colorado) have added some additional criteria, like elevation zones in the higher, snow covered mountains.

This proposal will be discussed again on the NHD Advisory Team call September 1, 2015. This discussion will provide the latest findings and give users and stewards the opportunity to contribute to development of the proposal. There is general agreement that a change to rectify this well-known issue with the classification in the arid west is needed, and this proposal will address a significant problem for current users of the data. As an example of the scope of the problem and proposed changes, Region 16 (Great Basin) will have over 450,000 intermittent flowlines reclassified to ephemeral and Region 15 (Lower Colorado) will have over 650,000 intermittent flowlines reclassified to ephemeral. Perennial flowlines will not be modified. Changes will be implemented by USGS directly, and stewards will not be required to do more work or provide additional resources. By clarifying the classification of ephemeral and intermittent streams, stewards and users will be able to focus on the details needed to improve the NHD.

The feature FDate values will not be changed for this edit. A sample, metadata process description that will be linked to every feature changed as follows: “Modified Hydrographic Category attribute values from intermittent (46003) to ephemeral (46007) on all unnamed, previously classified intermittent stream/rivers in hydrologic region 16. Named intermittent stream/rivers were not modified. Perennial stream/rivers were not modified. The modification was based on widespread concern expressed by USGS and users of the NHD about the over classification of streams in the arid west of the US. Presence of a name indicated the importance of the feature on the landscape and correlated well to modeled flow statistics. The attribute values were modified by USGS directly in the national database. These modifications are also being made in other regions in the arid west.”

The National Hydrography Requirements and Benefits Study by Steve Aichele

The interview phase of the Hydrography Requirements and Benefits Study is coming to close. As of August 28, there is one more Federal agency to interview and one more state to interview. Thanks to the National Map Liaisons and all the participants in the states and agencies for helping with the process. The next step will be to compile the results into consolidated summaries by state and agency. These summaries will be distributed back to the points of contact for their review and approval. Each of the summaries will be included in a data report produced by Dewberry this winter, and the data will be included in a geodatabase.

After that, the data will be analyzed both topically and spatially to identify high value requirements and geographies. A set of program recommendations to be developed during Fiscal Year 2016.

Cartographic Generalization Update by Ryan Teter

Tim Hines and Ryan Teter resumed hydrography cartographic generalization operations in 2015. The protocol for US Topo is to generalize the hydrography to a 1:24,000-scale standard using input data that may be larger than 1:24,000-scale. This is done using a generalization tool named CartoGen and is processed in conjunction with the three year cycle for US Topo production.

Here is how it works: NHD Features at the HU4 level are analyzed to determine where generalization is required. Next, local resolution HU8's are downloaded and the metadata is reviewed to determine when densification took place. Archived data consisting of HU8's with the dates prior to the date of densification are obtained to get a 1:24,000-scale density benchmark. Generalization tools are then used in a workflow process consisting of quality control, enrichment, pruning, simplification, and validation. First the local resolution data is reviewed to make sure the network is complete. Then the HUC8's are enriched with information on upstream drainage area, and creating raster partitions to identify various densities. A density expansion factor is then determined for each of the HU8's. A stratified network prune, prune of the short dangling tributaries, and waterbody prune is performed. Next, the NHDFlowlines, NHDWaterbodies and NHDAreas are simplified to make their geometry smoother. Validation is performed by analyzing correlation factors, average line segment lengths, feature counts, and a visual check. The data is then loaded for submission to the USTopo.

In fiscal year 2015 only Mississippi and Vermont were generalized. The NHD generalization requirements supporting fiscal year 2016 US Topo program of work are as follows, in order of priority: Iowa (in work), Kansas, Oklahoma, Kentucky, Indiana, North Carolina, and New York. While productions operations continue, the vector development team is improving the CartoGen tools. Many of the manual processes that used to take a large amount of time are being streamlined.

The GeoConflation Process by David Anderson

Conflation is the process of transferring attribution between two data sets (source and target) of spatially equivalent data to create a third dataset (conflated) with new geometry while maintaining most attribution from the source features and assigning identities to new features. With hydrography it is necessary to go several steps deeper into the process to apply model guidelines and apply the requested modifications into NHD production data.

This may seem fairly straight forward; however, let's look at densification through local resolution of an 8-digit hydrologic unit (HU8). A high-resolution (1:24,000-scale) HU8 may contain 5,000 – 20,000 features within the NHD model, not including table records. Local resolution data, say at 1:5000-scale, collection can increase the density up to six times that, or 30,000 – 120,000 features. Include the required table records and user would need to double, if not triple, that number of updates. That is a lot of records and features to manage during any automated vector process. Imagine doing that one feature at a time!

The GeoConflation tool is intended to assist users in taking local-resolution (target) geometry (> 1:24,000-scale) and transfer attribution from any high-resolution (1:24,000-scale) features (source) which are spatially comparable. Not all source data will be spatially comparable because of complexity and environmental changes in the data. The primary function of the GeoConflation tool is to maintain as many assigned reachcodes and geographic names on features from the source data as possible. The tool does take a look at a 150-meter buffer around the source to locate comparable target features, which is quite generous. The tool furthermore applies reachcode assignment and feature-to-feature application rules to ensure conformity with current NHD model standards.

To use the tool, the user is required to prepare their data in current NHD schema with minimal attribution. [GIS] Conflation requires that both source and feature datasets have similar schema in order for the processing to work, unless a feature manipulation engine is used. A user must provide the feature's identity (feature type and code) and flow direction for their data. This requirement allows the user to update any current NHD feature classification and flow direction based on local observations and also allows for quality control checks to be performed prior to running the process.

During the first part of the process, source features with reachcodes (NHDFlowline and NHD Waterbody) are spatially compared and if the comparison meets given tolerances, the attribution is transferred to holding fields within the target. Additionally generated during these first steps are a series of 'error' queues that will drive the user to check the validity of the transference. The user then uses a queued reviewer that allows them to update the features and identified errors.

After these first steps are complete, a series of actions assign permanent identifiers, validates which source features must be removed, assign new reachcodes for new features, validate and verify routing of reach codes and geographic names, build required transfer tables, and finally clean and prepare the data for transfer. The final step in the process is to transfer all the changes collected in the conflated dataset to a dataset that can be ingested into the NHD production data. This all must be done in a manner that limits the propagation or cascading of errors, both human and machine.

If you have any questions about the GeoConflation process or tools used, please contact David Anderson (danderson@usgs.gov or nhd-gct@usgs.gov) for more information.

Using NHD to Identify What is Downstream of a Spill Site by Al Rea

When a spill occurs, such as the August 5, 2015 release of mine waste from the Gold King Mine in Colorado, the NHD can help provide answers to questions such as “What is downstream?” and “Where have water quality data previously been collected?” Here is how:

- Locate the Gold King Mine Site using coordinates 107.6384° W, 37.8945° N, which are listed as the location of the mine at <http://www2.epa.gov/sites/production/files/2015-08/documents/goldkingminewatershedfactsheetbackground.pdf> . This location is on North Fork of Cement Creek.
- Download the 1408 Subregion NHD dataset, which includes the spill site.
- In ArcMap, load the geometric network from NHDHR. Turn on the Utility Network Analyst toolbar via Customize>Toolbars.
- Using Utility Network Analyst toolbar, place an Edge Flag on NF Cement Creek near the mine location. Set the analysis options results to return a selection of the Edges. Set the trace task to “Trace Downstream”, then click the Solve button. The trace will go all the way to the Colorado River, in Lake Powell, which is the end of the 1408 Subregional NHD dataset, selecting 2213 features. These are the flowlines that are downstream.
- To find the water bodies that are downstream, add a relate to NHDFlowline, using the WBArea_Permanent_Identifier field to relate to the Permanent_Identifier field in the NHDWaterbody feature table. Follow the relate, and it will select 9 NHDWaterbody features. Only one of these features is larger than 0.01 square km, and that is the San Juan River arm of Lake Powell.
- Now take a look at where water quality data has been collected:
- Add NHDPointEventFC from the NHDHR to ArcMap. Do a Select by Attribute, creating a new selection from NHDPointEventFC using the query:
 - EventType = 57004 (Water Quality Station)
- The result is 577 points. Now do a Select by Location, selecting from the current selection, for NHDPointEventFC features within 10 meters of the selected NHDFlowline features. The result is 32 points. These are the water-quality stations that have been indexed to the NHD that are downstream of the site in the 1408 Subregion. The results look something like this:
See ftp://nhdftp.usgs.gov/Hydro_Images/GoldKingTrace.jpg.

NHD Network Improvement Project August 2015 Status Report by Cynthia Ritmiller

Initial Phase Network Improvement – Remaining

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

Initial Network Improvement 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 - Sub-regions 0101, 0103, 0104, 0106, 0107, 0108, and 0110 were sent to Horizon Systems for the creation of HiRes NHDPlus. The three remaining sub-regions (0102, 0105, 0109) will be sent to Horizon Systems once Events have been updated.
- Region 02 - New pre-staged Sub-Regions were received and QA/QC checks were ran any edits will be completed, before the region is sent to Horizon Systems for the creation of HiRes NHDPlus.

- Region 03 - Three sub-basins need to be reviewed and may need edits, sub-regions include 0309 and 0311. Will complete these edits working with our partner's schedules.
- Region 04 - New pre-staged Sub-Regions were received and QA/QC checks were run. Now completing edits.
- Region 05 - Waiting to review one sub-basin within sub-region 0514.
- Region 06 - The entire region (Sub-regions 0601, 0602, 0603, and 0604) was sent to Horizon Systems in August for the creation of HiRes NHDPlus
- Region 07 - completed double check phase. As new data become available it will go through QA/QC check process again.
- Region 08 - Completing double checks within this region. Sub-regions 0801, 0802, 0804-0807 are complete, edits in 0803 remain.
- Region 09- completed double check phase. As new data become available it will go through QA/QC check process again.
- Region 10 - Completed double check phase. As new data become available it will go through QA/QC check process again.
- Region 11 - Completing double checks within this region..
- Region 12 - New pre-staged Sub-Regions were received, QA/QC checks were run any edits will be completed, before the region is sent to Horizon Systems for the creation of HiRes NHDPlus.
- Region 13 - completed double check phase, as new data become available it will go through QA/QC check process again.
- Region 14 - QA/QC checks were run. Only two sub-basins remain. As new data becomes available it will go through QA/QC check process again.
- Region 15 - Completing edits. As new data become available it will go through QA/QC check process again.
- Region 16 - Completed double checks for this region in January. As new data become available it will go through QA/QC check process.
- Region 17 - QA/QC checks have been run. Completing the edits (subregions 1701, 1705, 1706, and 1707 remain).
- Region 18 - completed double check phase. As new data become available it will go through QA/QC check process.
- Region 19 (Alaska) - Initial Phase Network Improvement in progress see above.
- Region 20 - Completed double check phase
- Region 21 - Completed double check phase
- Region 22 (Pacific Islands) - Subregions 2201, 2202 and 2203 were given to Horizon Systems April 1st 2015 to begin producing HiRes NHDPlus.

Note: Regions will be edited as per the NHDPlus contract schedule. Before starting a Region the area POC will be contacted.

NHD Quality Control Errors and How to Resolve Those Errors by Bill Smith

Many NHD editors are reporting issues resolving particular errors that are showing up frequently in their Quality Control (QC) error reporting 'Data Reviewer' tables. In some cases, editors are asking why these errors are just now showing up in the QC process. Perhaps the time is right to start a regular column that takes errors that are appearing on a regular basis, discuss the errors, explain why the errors are showing up, and provide guidance on how to resolve these errors. In the next few issues of the NHD Newsletter, problem jobs submitted to USGS for review will be studied, and prevalent errors will be discussed.

- Error: "Feature with length less than 2.0 meters";

- QC Check: Flow Checks (Minimum Length);
- NOTES Description: “Feature Length is less than 2 meters (MinimumLengthValidation)”;
- REVIEWSTATUS Description: “Feature with length less than 2.0 meters. Please fix this feature before running Flow checks”;
- Severity: 1;
- Description of Error: The error is indicating an NHDFlowline features has been located in the dataset that has a total length less than 2- meters.
- Why are we now seeing this error? The NHD editing/QC process has previously checked for NHDFlowline features less than 3-meters in length, but research by USGS is indicating features between 2 and 3 meters in length were causing issues with MValue (Measure) calculations. The QC Checks were modified to now look for all NHDFlowline features less than 2-meters in length.
- Error Resolution: Increase the length of the offending feature to a length greater than 2-meters. This may be accomplished using one of several different methods.

Method 1: Use the NHD Update Toolbar, 'NHD Flowline' tool, 'Modify Geometry', 'Modify Feature' function. Select a flowline feature either upstream or downstream from the offending feature and move the end vertex away from the offending feature. Use the ESRI 'Measure' tool to verify the offending feature will be at least 2-meters or greater in length once the edit has been completed and saved. Select 'Finish Modify' and 'Apply Rules'. Next move the end vertex of any adjoining feature (perhaps a confluence or a divergent feature), and make sure to snap this end vertex to the end vertex of the first edited feature. Again, 'Finish Modify' and 'Apply Rules'. Finally, move the end vertex of the offending feature, making sure to snap this end vertex to the two previously moved end vertices. 'Finish Modify' and 'Apply Rules'. Review your work, and if satisfied, select 'Save'.

Care should be exercised when moving end vertices to not allow adjoining features to be accidentally split. Remember to go back to your Reviewer table and mark this error record as 'Resolved'.

Method 2: In some cases, the offending feature is at the end of a larger NHDFlowline feature. If this is the case, you may delete the offending feature, using the 'NHD Flowline' tool, 'Delete Geometry' function, 'Apply Rules, and 'Save'. A user may then use the 'Modify Geometry' function to extend the end vertex of the larger feature, making sure to snap that end vertex to the adjoining feature. Again, 'Apply Rules' and 'Save'. Always remember to go back to your Reviewer table and mark that error record as 'Resolved'.

Method 3: Another method to resolve the same issue as found in method 2 above, a less than 2-meter feature adjoined to a larger feature, involves the use of the 'Merge' function. Using this method, you would select the offending feature and the adjoining larger feature, then use the 'NHD Flowline' tool, 'Modify Geometry', 'Merge Feature' function. Make sure to review the attributes of both selected features and attempt to preserve the reachcode, GNIS_ID and GNIS_Name that best fits that particular situation. Once the merge is complete, 'Apply Rules' and 'Save'. Remember to go back to your Reviewer table and mark this error record as 'Resolved'.

Once all NHD datasets have been edited and quality controlled using the current quality control requirement, these errors should not be an issue in the future.

Hydrography Seminar Series - A Digital Hydrologic Framework Supporting SPARROW Modeling

The next Hydrography Seminar will be Thursday, September 24, 2015, at 2:00 PM Eastern Time. It will feature a presentation by John Brakebill of the USGS on nutrient transport using the SPARROW

modeling system: “A Digital Hydrologic Framework Supporting SPARROW Modeling.” More information will be posted at <http://nhd.usgs.gov/HydrographySeminarSeries.html> in the next week.

Digital hydrologic networks, which comprise stream reaches depicting surface-water pathways and their associated drainage catchments, are a key component to hydrologic analysis and modeling. Collectively, stream reaches and catchments form common spatial units that can be used to frame the descriptions of aquatic and watershed processes affecting water quality and streamflow. In addition, the topology of a hydrologically connected network allows for the simulation of water movement, providing the ability to route constituents throughout the landscape. Digital hydrologic networks have evolved from derivatives of mapping products to detailed, interconnected, spatially referenced networks of water pathways, drainage areas, and stream and watershed characteristics. These properties are important because they enhance the ability to spatially evaluate associated factors that affect the sources and transport of water-quality constituents over land and in streams at local and regional scales. An example of a modeling application that depends on a digital hydrologic network is SPARROW, a process-based/statistical/spatial model that establishes relations between quantities of monitored contaminant flux, contaminant-sources, aquatic transport processes, and the physical characteristics affecting contaminant transport.

The USGS NWAQA program is enhancing the qualities of the medium resolution NHDPlus geospatial dataset (based on the 1:100,000-scale National Hydrography Dataset) in order to support regional and National SPARROW models estimating water quantity and quality. Topological improvements to the network have been conducted, providing the basic foundation for the spatial framework used to geographically reference and route necessary monitoring, contaminant source, and transport characteristics within the SPARROW modeling structure. Impoundments, long-term water-quality and stream-gaging stations also have been associated to the network and quality controlled for accuracy. This talk describes the utility of the NHDPlus network supporting SPARROW applications, and describes some of the methods and data associated to the network.

NHD Photo of the Month

This month’s photo is a wild rice marsh at the Big Sable River mouth where it enters Hamlin Lake in Michigan. The photo was taken by Andy LeBaron of the Michigan Department of Environmental Quality. See <ftp://nhdftp.usgs.gov/Hydro/Images/BigSableRiceMarsh.jpg>. Submit your photo for the NHD Photo of the Month by sending it to jdsimley@usgs.gov.

July Hydrography Quiz / New August Quiz

Evan Hammer of the Montana State Library was the first to correctly guess the July NHD quiz as the three lakes surrounding Madison, Wisconsin; Lakes Mendota, Monona, and Wingra. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography120.JPG>. Evan works at the Montana State Library which is a state government agency committed to strengthening libraries and information services for all Montanans through leadership, advocacy, and service. They are unique among state libraries in that they have a heavy emphasis on providing access to information about Montana’s natural resources through the Natural Resource Information System (NRIS). They are also home to the state Geographic Information Program tasked with developing and providing access to the 15 Montana Spatial Data Infrastructure (MSDI) Framework Layers established through the Montana Land Information Act. Evan works with amazing team of GIS Professionals that are committed to developing high quality GIS datasets for the state and ensuring they are available for widespread public use.

Others with the correct answer (in order received) were: Calvin Meyer, Michael Wiedmer, Marc Weber, Daniel Button, Matt Rehwald, Ron Wencl, David Hockman-Wert, Ralph Campbell, Eric Simley, Al Rea, Linda Davis, Barbara Simpson, Robert Wurgler, Vicki Lukas, David Asbury, David Straub, Jim Seay,

Joanna Wood, Stephanie Kula, Steve Shivers, Demetrio Zourarakis, Andrew LeBaron, Michael Carson, John Kosovich, and Roger Barlow.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography121.jpg>. This month's quiz is a river. It flows top to bottom and empties into a large estuary noted for its harbor and situated by a major city. Where 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.

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

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