

How Accurate is the NHD?

One measure of the accuracy of the NHD is its horizontal positional accuracy. Normally in topographic mapping this is measured by comparing well-defined points on the map to the corresponding “ground truth.” In general, the United States National Map Accuracy Standard (NMAS) for 1:24,000-scale mapping is 0.02 inches <http://egsc.usgs.gov/isb/pubs/factsheets/fs17199.html#US%20National>, which translates to 40 feet on the ground. To measure the accuracy of a stream on the NHD there are no well-defined points, but if enough points were sampled, say 100, they could be used to approximate a well defined point because the uncertainties would begin to cancel each other out as the sample grows larger.

For a study the South Platte River is chosen. Six diverse locations along the river are sampled. Each sample measures the deviation of the NHD river from the river identified in contemporary orthophotography imagery at 100 foot intervals for 100 consecutive points. In effect the measure is really of relative positional accuracy because orthoimagery is not ground truth as it has its own degree of absolute positional accuracy error. To see a sample image of the study go to <ftp://nhdftp.usgs.gov/Hydro/Images/Sample3Example.bmp>

The statistics table measures (1) the average width of the river, (2) the average width of the floodplain adjacent to the river, (3) the stream type in the NHD, (4) the number of measurements in the sample, (5) the interval between the measurements, (6) mean lateral deviation of the 100 measurements, (7) the standard deviation of the lateral measurement, (8) the maximum deviation of the sample, and (9) the measure at the 90th-percentile. Measurements are in feet. The means hover around 20 feet, the standard deviations are reasonably tight, the maximums are what might be expected with meandering streams, and the 90th percentile indicate the bulk of the measurements are reasonable when compared to the “40-foot” rule.

1. Sample 1 is the very headwaters of the Middle Fork of the South Platte River at an elevation of 11,000 feet where water running off the slopes of nearby 13,000 foot mountains to create a distinct perennial stream in an alpine plain. This first order stream meanders significantly and at a 1:4,000-scale of analysis there is rarely a match between the stream as portrayed in the NHD and the contemporary imagery. However, at 1:18,000-scale the NHD lines up quite well to the imagery.
2. Sample 2 is about one mile further downstream after the stream has become a second order stream and is now distinctly running through a U-shaped glacial valley. The stream continues to meander significantly at the bottom of the broad “U” and rarely do the meanders of the NHD stream match the meanders of the stream in the imagery at 1:4,000-scale. At 1:18,000-scale the mismatch is not particularly evident.
3. Sample 3 is two more miles downstream below a small Montgomery Reservoir. At this location the Middle Fork of the South Platte River is now a third order single-line stream in a flood plain about 700 feet wide at the bottom of a broad valley. At 1:4,000-scale the stream lines up reasonable well with a few larger meander deviations and at 1:18,000-scale the river lines up very well.
4. Sample 4 now deals with South Platte River just below the confluence of the Middle and South Forks. Here the river is now a “double-line”, or polygonal, NHD Area river in the NHD, because the river is now averaging more than 50 feet wide. To measure deviation, the center of the river in the NHD (not necessarily the Artificial Path) is compared to the center of the river on the imagery. The river meanders significantly with one horseshoe bend after another as it flows

through a very broad floodplain formed at the bottom of an ancient lake. The meanders continue to be mismatched, but not consistently. At 1:18,000-scale the mismatch seems only moderate.

5. Sample 5 is the South Platte River just below Eleven Mile Dam. Again the river is a double-line stream. The floodplain is now considerably smaller, about two to three times the bank-to-bank width of the river. The river meanders, but now the meandering is constrained by high relief granite mountains immediately adjacent to the small floodplain. Only in a few instances are the meanders mismatched. Besides meander differences, the width of the river varies between the NHD and the imagery to a small degree. At 1:4,000-scale the river is obviously not perfectly matched to the imagery, but at 1:18,000-scale the match seems very good.
6. Sample 6 is the South Platte River below the confluence with Tarryall Creek, which adds a significant amount of water to the river. Meandering is fairly consistent and river width differences are moderate. The terrain is of slightly lower relief, but still composed largely of granite hills. The floodplain is about twice the river width. At 1:18,000-scale the NHD and imagery line up very well.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	
Avg river width	3ft	6	10	30	60	60	
Floodplain wth	100ft	300	700	4,000	200	150	
Stream Type	Single-Line	Single-Line	Single-Line	Double-Line	Double-Line	Double-Line	
Measurements	100	100	100	100	100	100	
Interval of meas	100ft	100	100	100	100	100	
Mean Deviation	27.04ft	20.50	20.0	24.65	15.81	20.54	
Std. Deviation	20.3ft	25.5	14.3	17.4	12.7	20.6	
Maximum	92ft	78	70	104	66	91	
90 th Percentile	53ft	45	39	45	31	50	

NHD Update Process Improvements - July Update by Paul Kimsey

The NHD Update Process Improvements Project is definitely making strides towards releasing a final product. The second round of Beta testing included seven state partners as well as the NHD POC's and in-house Beta team was completed on July 15th. The testing included all workflow functionality minus QC and Utilities. A summary of results from the Beta testing are as follows: (1) Website Submissions: 18 submittals - The majority of submittals were regarding access to the website, problems with user accounts or tweaking the existing functionality. All submittals have been addressed with web developer and will be implemented by the next round of testing. (2) Help Documentation Submissions: 25 submittals - The majority of the submittals addressed tool usage where something was not well understood, the error returned by the tool and documentation did not match, or content was missing. (3) Geo Edit Submissions: 167 submittals - None of the errors were considered to be major and will be addressed in the July 22nd – August 12th sprint. The submittals have been recorded with a “comments” field to provide feedback to the Beta test group. Upcoming development will focus on implementing QC functionality (ESRI Data Reviewer), implementing all supporting Utilities and miscellaneous outstanding functionality such as edit history and close job. The next round of Beta testing is tentatively planned for late August and should include all workflow functionality.

Hydrography Event Management (HEM) Release by Ariel Doumbouya

The newest releases of the HEM Tools for both ArcGIS 9.3 and ArcGIS 10 are now available for download from the NHD home page at <http://nhd.usgs.gov/> or from the HEM_Tools myUSGS community. These releases for ArcGIS 9.3 and ArcGIS10 are the result of the first phase of the current development cycle. A second release for ArcGIS10 that incorporates additional functionality and bug

fixes can be expected by October 1st, 2010. See below for a summary of changes incorporated for these current 9.3 and 10 releases. No additional functionality will be added at ArcGIS 9.3. *New Features/Enhancements to this version include* spatially limiting which HEM events get processed during batch sync. Users can select a polygon feature class with the option of using SQL to select a subset or single polygon to use as a spatial filter. The HEM tool will now check to make sure the configuration xml file (HEMConfig.xml) is not set to 'Read Only'. If so it will try to change the file to Read/Write for the user. Some HEM forms had a bad habit of diving behind the ArcMap or ArcCatalog window causing confusion and extra work for users. This has now been fixed where appropriate. In addition seven identified bugs were fixed. For more detailed information see the HEM_Tools myUSGS community or email HEM@usgs.gov.

Esri Special Achievement in GIS (SAG) Award

Congratulations to two of this year's winners of the Special Achievement in GIS (SAG) Award presented by Esri at their recent International User's Conference. The first is The University of Alaska Southeast and USDA Forest Service - Alaska Regional Office for the SouthEast Alaska Hydro (SEAK Hydro) project. The award is given to user sites around the world to recognize outstanding work with GIS technology. The SEAK Hydro project stood out from more than 100,000 others. The second is Alabama Department of Economic and Community Affairs. More about the Alabama award next month. In Alaska, The Southeast Alaska Hydrography Database Project (SE AK Hydro) is an effort to reconcile local hydrography-related datasets across natural resource management agencies within Southeast Alaska; and synchronize those geometries to the National Hydrography Dataset (NHD). SE AK Hydro is a collaborative effort between the USDA Forest Service, Alaska Department of Fish & Game, US Fish & Wildlife Service, US Geological Survey, and University of Alaska Southeast (UAS). Each agency recognizes the need for a single source authoritative hydrography dataset capable of meeting local business needs, as well as the need to contribute to the improvement of the National Spatial Data Infrastructure through the NHD. Receiving the award was Eric Johnson, Jim Schramek, Mike Plivelich, and Hank Nelson. To learn more see: <http://events.esri.com/uc/2011/sag/list/?fa=Detail&SID=1272>

California 303(d)/305(b) Integrated Report

The California State Water Resources Control Board in Sacramento has developed an outstanding web application for presenting information on water quality and the Clean Water Act (CWA). Every two years, the State Water Board reports to the US Environmental Protection Agency the list of pollutant-impaired water bodies (the "CWA 303(d) list") and a report on the quality of waters (the "CWA 305(b) list") in California using what is known as the Integrated Report. The current 2010 Integrated Report application map is based upon the old EPA Reach File 3 layers, but for the 2012 listing, the mapping will be based on the high-resolution NHD using the suite of HEM tools and some in-house customizations. Go to the website page at http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml. Click on the "Map" tab and zoom in to an area of interest. Click on a stream or waterbody to get more detailed information about the listing. For more information contact Jeff Kapellas at jkapellas@waterboards.ca.gov.

Wisconsin Surface Water Data Viewer

The Wisconsin Department of Natural Resources has produced an excellent surface water viewer: The Surface Water Data Viewer. The Surface Water mapping application provides water resources, monitoring and water quality assessment data. It allows the user to view and analyze watershed-related data (lakes and streams, monitoring stations, impaired waters, and Outstanding/Exceptional Resource Waters. See <http://dnrmaps.wi.gov/imf/imf.jsp?site=SurfaceWaterViewer>. To use it zoom in to an area of interest holding the shift key down and drawing a box with your cursor. Use the Identify function to get

information about a stream or lake. Note that state identifiers are used rather than the national reach code system or linear referencing system since this viewer is based on a state database and not the NHD. Click on Designated Waters to see stream and lakes with special designations. Click on Themes, then Floodplain Information to see FEMA maps of floodplains. Also click on Wetlands and Wetland Indicators to see wetland mapping.

American Water Resources Association – Specialty Conference on GIS

The 2012 AWRA Spring Specialty Conference on Geographic Information Systems and Water Resources VI will be held March 26-28 in New Orleans, Louisiana at the Sheraton New Orleans. Abstracts are due October 3, 2011. See <http://www.awra.org/meetings/Spring2012/index.html>

NHD Photo of the Month by Kathy Isham

This photo was submitted by Tim Hines of the USGS in Rolla, Missouri. According to the Missouri Department of Conservation, the spring has a discharge of 90 million gallons per day. At 300 ft, Blue Spring is the deepest known spring in Missouri. Blue Spring is a large, beautiful, undisturbed spring and spring branch with associated aquatic plants and animals surrounded by forest in the Current River Hills region of the Ozarks. The Osage Indians reportedly called this spring “Spring of the Summer Sky.” Spring water is actively dissolving away limestone and or dolomite as it moves through the earth. Springs are actually excavating new caves through this process. This dissolved limestone and or dolomite, along with the influence of the spring's depth and the blue of the sky, impart the blue color of the spring. The recharge area for the spring includes the headwaters of Logan Creek which is nearly 10 miles away. This part of the recharge area lies in the topographic watershed of the Black River despite the fact that the spring itself is feeding the Current River. To see the photo of the month go to ftp://nhdftp.usgs.gov/Hydro/Images/Blue_Springs_MO.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.

June Hydrography Quiz / New July Quiz

Jerry Sullivan of Wisconsin Department of Natural Resources was the first to guess the June NHD Quiz as Lock and Dam Number 9 on the Mississippi River near Lynxville, Wisconsin. The lake is Lake Winneshiek. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography71.pdf>. Jerry is a GIS Data Specialist with the Wisconsin Department of Natural Resources in Madison, Wisconsin, working on geospatial infrastructure support for the agency. He has worked in GIS in Madison for nearly 30 years, including teaching undergraduate, graduate, and extension GIS courses. He also designed the first ESRI t-shirt, and the logo adopted by NSDI. To learn more about Jerry’s organization go to <http://dnr.wi.gov/maps/gis/>.

Others with the correct answer (in order received) were Jennifer Sharpe, Chris Lund, Katharine Kolb, Edwin Abbey, Tom Denslinger, Dave Straub, Ken Koch, Richard Patton, Christina Boggs, and Chrystal Bowles.

Edwin Abbey adds: (from <http://www.mvp.usace.army.mil/environment/default.asp?pageid=82>)

“Many of the natural islands in Lake Winneshiek have eroded and disappeared. These islands served to break up wind fetch and wave action, reduce turbidity, and provide protection to shallow aquatic areas supporting aquatic plant beds. The increased wave action and associated turbidity have contributed to the observed loss of aquatic plant beds used by migratory waterfowl. The proposed project would create two islands, each about 8,000 feet long, in the center of Lake Winneshiek to reduce wave action in this large, open water area. If suitable construction material can be found in the backwater area, dredging would

provide up to 20 acres of additional deepwater habitat. About 1,200 acres of backwater area would be directly affected by the project.”

This month’s hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography72.pdf>. Name this lake, which is highly characteristic of a lake behind a dam. The red squares are dams. The dark blue polygon is a lake, the light blue polygon is a submerged stream, and the purple is inundation area. This is a project of the U.S. Army Corps of Engineers and is impounded behind the second largest rock filled dam in the Eastern U.S. Send your guess to jdsimley@usgs.gov.

Upcoming NHD Training

Hydrography Event Management tool 4-hour WebEx training.

Sign up at: <http://nhd.usgs.gov/tools.html#hem> Contact: HEM@usgs.gov

Getting Started Part 1 - August 17

Advanced Editing Part 2 - September 7

Data Maintenance Part 3 - September 28

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.

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.