

USGS National Hydrography Dataset Newsletter
Vol. 9, No. 1, November 2009
by Jeff Simley, USGS

Ninth Year of the NHD Newsletter

This NHD Newsletter marks the beginning of the ninth year for the newsletter. Every month for the past eight years customers of the NHD have received a newsletter communicating what is happening in the NHD program and also covering related WBD, NHDPlus, and hydrography topics. The ninth year will see some exciting new developments as we reorient the stewardship program to cover a broader range of participants and the USGS launches its new data viewer, making hydrography and geospatial data in general more accessible to all. As always, your participation is vital to make hydrography effective at the USGS and throughout the nation.

NHD Datum Shift Update by Ariel Bates

The NHD datum shift problem described in previous newsletters is continuously being corrected by the USGS staff. Original estimates at 3% of the 7.5-minute quadrangles with a datum shift have in actuality only been found in approximately 0.2% of the quadrangles. States that have been inspected and corrections made are New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Tennessee, Kentucky, Ohio, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Texas, Oklahoma, Kansas, North Dakota, Montana, Idaho, New Mexico, Arizona, California, West Virginia, Louisiana, Nebraska, South Dakota, Illinois, Florida and Mississippi. In total, 36 states are complete, 7 are currently in work and 7 remain.

NHD Image Update Process by Marshall Creighton

The process to update major NHD features in anticipation of US Topo map production has produced the following results from the Rolla office: In Kansas 1,479 quads were inspected and changes made to 7 subbasins and 17 features. In the South half of Texas 1,747 quads were inspected and changes made to 4 subbasins and 7 features. In Indiana about 300 out of 679 quads have been reviewed. Necessary revisions will start in approximately 2 weeks. In general, little has been found that needs to be revised. The inspection was complicated by high water imagery in Kansas and low water imagery in Texas. Both of these conditions prevented an accurate assessment of potential changes to existing waterbodies and double line drains. What was found and added were new major features not present in the database but visible on the image. The office is now moving onto states like Tennessee and Kentucky where the number of revisable and new features is expected to increase. In general, combined along with the datum shift review, about 10% of the quads in any state contain a revisable feature or features. More will be known when Tennessee and Kentucky are completed.

Watershed Boundary Dataset (WBD) Integration with NHD Status Update by Steven Daw

The WBD integration process continues to move forward. The WBD data model was completed and tested last summer. Minor changes continue to be made to the model though as we move closer to integration. How boundaries that cross international borders are treated is one such issue that required a model change. With the WBD model in place, requirements for migration and editing were documented. There are significant delineation differences between the old 250k resolution hydrologic unit data and the WBD, NHD reach codes will need to be adjusted to match the new WBD boundaries. Key to integration is the mass migration of the affected reach codes to reflect the new WBD margins. Testing of reach code migration and verification of the results is going on right now. WBD data will be loaded into the NHD at the end of the calendar year 2009 and NHD users will receive WBD data when they check out or

download NHD data in January 2010. The stewardship web portal for downloading and updating WBD data is in development also along with WBD editing tools to be used by the state stewards. The web interface and tools will be ready in time for the national WBD roll out in March 2010.

Hydrography Event Management Tools Update by Ariel Bates

The Hydrography Event Management (HEM) Tools are a set of ArcGIS tools that support the creation, management, and refresh of event data that are referenced to the NHD. The HEM Tools are now being fully supported by a partnership between the U.S. Geological Survey (USGS), the Oregon State Office of the Bureau of Land Management (BLM), and the U.S. Environmental Protection Agency (EPA). USEPA contractors (RTI International) are providing HEM technical support to environmental organizations reporting to EPA. The USGS has developed a help desk for HEM Tool support (<http://nhd.usgs.gov/tools.html#hem>) and a myUSGS community as a portal for all information related to the HEM Tools. The USGS is currently developing training for the HEM Tools. BLM is providing operations and maintenance support as well as managing future development cycles. Version 2.2 planning is currently underway; BLM is currently gathering requirements and is establishing working groups for this next release. Please send new HEM requirements requests to Dana_Baker@blm.gov. For more information on any other aspect of the HEM Tools please contact HEM@usgs.gov.

Minor Patch Release to HEM Tool by Ariel Bates

There is a minor patch release of the HEM tools posted on the HEM_Tools myUSGS community.
What's New in HEM 2.1.3588

1. Bug Fix: Import Selected Flowlines as new line events was not correctly creating related _M records in event featureclasses that use the Multi-Route Line format. This issue is now resolved.
2. Bug Fix: When creating event featureclasses, the Offset field is now correctly being created as "Nulls ok".

Feature Catalog – Fun Facts by Keven Roth

LAKE/POND - A standing body of water with a predominantly natural shoreline surrounded by land. NHDWaterbody.

RESERVOIR - A constructed basin formed to contain water or other liquids. NHDPoint and NHDWaterbody.

What is the difference between a lake/pond and a reservoir? There isn't a "right" answer. Different terms like reservoir, lake, man-made lake, and impoundment are used interchangeably. Some impounded waterbodies are named reservoirs and some are named lakes. For example, all of the impoundments on the upper Missouri River are named "lakes" including Fort Peck Lake in Montana, Lake Sakakawea in North Dakota and Lake Oahe and Lewis and Clark Lake in South Dakota. And to make it even muddier, many impoundments formed by dams for navigation form slack-water pools along stream/rivers that still maintain their riverine appearance. Some of these impoundments are known by both names – the river and the lake.

In the NHD, a reservoir is defined as a "constructed basin". The definition is intended to distinguish a basin that was constructed to contain liquids from a standing body of water with a predominantly natural shoreline or Lake/Pond. In the NHD, reservoirs are things like filtration ponds, treatment ponds, aquaculture ponds and water storage ponds. Waterbodies that are the result of water impounded behind a dam are collected as Lake/Pond. The Feature Templates for both Lake/Pond and Reservoir contain some instructions under "Source Interpretation Guidelines" - *Refer to the feature definition to decide how to*

categorize a given feature instance. Do not use the proper name of the feature as a guide. Many features that are known as "Reservoirs" or labeled on the graphic as "Reservoirs" will be captured as LAKE/PONDS. "Stock Tanks" may be RESERVOIR or LAKE/POND depending on their form. As a general rule, if a water body has a geometric shape or other information indicates it is contained by a constructed basin, capture it as RESERVOIR. If it does not appear to be contained by a constructed basin, capture it as LAKE/POND. The NHD classification methodology generally distinguishes features based on their form, while the attributes are often used to define functions. Now that the National Inventory of Dams (NID) data has been linked to the NHD as events, users can easily determine if a Lake/Pond has been formed by a dam and they can get information about the dam and the impoundment directly from the NID database.

Applications of the NHDPlus

The role of the NHD, WBD, and NHDPlus was a recurring topic at the recent annual conference of the American Water Resources Association held in Seattle, Washington. Michele Cutrofello of RTI International presented the paper: "Populating Watershed Models on the NHDPlus Scale Using National Data Sets: Methods and Opportunities", co-authored with Brandon Bergenroth, James Rineer, Robert Truesdale, and William Cooter, also of RTI International. The talk revolved around the problem statement that recent issues have identified a need for a single scalable model that can be applied across a region to incorporate human interactions on the natural hydrologic cycle. The paper proposed RTI's solution to create and populate a model on the NHDPlus hydrologic network using nationally available datasets with limited additional input on local conditions (e.g. withdrawal rates) from users.

Michele noted the qualities of the NHDPlus as a platform pointing out that the NHD is a publically available surface water database maintained jointly by the USGS, EPA and many participating states. It provides a framework for nationally consistent modeling and decision support system and allows for cost-effectively parameterizing models for multiple users at multiple locations. NHDPlus catchments provide an inherent scalability to the framework as the catchments average approximately 2.5 km² across the country and can easily be aggregated up to larger watershed units. This means that increased networking within lands of larger accounting units can aid in prioritizing mitigation measures and locations. Furthermore, the NHDPlus contains additional data for each network catchment and importantly has the ability to integrate additional data from numerous sources. Examples of external data that can be tied to the catchments include: 2001 NLCD land cover data (MRLC), SSURGO soils data (USDA NRCS), 2001 NLCD impervious surface (MRLC), NCDC COOP meteorological station records (NOAA NWS), mean annual average erosivity values (USDA NRCS WCC), and first and last freeze dates for growing season (NOAA). Michele reviewed a number of technological advantages of the RTI approach which include efficient processing and storage measures for these data. Although there are some limitations of older data sets (2001) and generalizations of some areas (soil surveys), the data are provided for all areas of the country eliminating time-consuming data gathering steps for model applications.

This national data newly georeferenced to the NHDPlus will be applied within RTI's National Water Allocation and Quality Model (presented in a poster session), which is currently under development. RTI aims to combine the NHDPlus national data framework with an intermediate-level watershed model (with enhancements) to provide users a common modeling application for all areas of the nation. This national model will provide an opportunity to examine the influences of humans and climate change anywhere in the contiguous U.S. at the local, watershed, or regional level. For more information, contact Michele Cutrofello at mcutfello@rti.org.

Stormwater Tracing on the Web by Pierce County, Washington

An interesting web application from Pierce County, Washington shows you how water flows in the county. It was designed to promote awareness about stormwater runoff and how pollutants can impact Puget Sound and natural waterways. See <http://matterhorn11.co.pierce.wa.us/waterflow/> The web site uses GIS technology to display map features such as roads, cities, and hydrology. GIS locate functions allow users to search and display an address to begin the trace. The water flow trace function uses a network of streams and major water bodies to calculate the direction of water flow. Stormwater is rain that is not absorbed into the ground. This water flows off property into storm drains and ditches, which empty directly into lakes, streams, rivers, and Puget Sound. As stormwater runoff flows over yards, sidewalks, and roads, it picks up pollutants such as yard chemicals, oil, grease, soap, and bacteria from pet waste. Stormwater runoff also causes flooding. This web site shows you where the stormwater runoff flows once it leaves your property. Currently, it traces the estimated direction of local waterways that your stormwater flows into. By better understanding where your stormwater runoff goes, you can help prevent water pollution, flooding, and other impacts to our local waterways.

NHD Photo of the Month

Jeff Simley of the U. S. Geological Survey has submitted the featured photo for this month of Deluge Lake high in the rugged Gore Range of Colorado ftp://nhdftp.usgs.gov/Hydro_Images/Deluge.pdf. This lake is typical of high alpine lakes in mountains formed as retreating glaciers left moraines that impounded meltwaters. Since the glaciers, melting winter snows keep the lakes full and usually drain with a perennial stream. Lakes such as this are stocked with fish dropped from airplanes by the Colorado Division of Wildlife. The photo was taken 1,500 ft. above the lake, which itself is at 11,700 ft. To submit your photo to be considered for the NHD Photo of the Month, please send it to krisham@usgs.gov.

AWRA Conference

The American Water Resources Association's popular series of conferences on GIS & Water Resources continues with its sixth GIS & Water Resources conference, this time in Orlando, FL March 29-31, 2010. For the latest information visit: <http://www.awra.org/meetings/Florida2010/>

October Hydrography Quiz / New November Quiz

Chris Markuson was the first to correctly guess the October hydrography quiz as Elephant Butte Reservoir in New Mexico. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography51.pdf>. Chris is the GIS Manager for Pueblo County, CO. He has been working with Chris Brown at the State Division of Water Resources in Denver, and with Stephanie Schupbach (formerly with LSA in Ft Collins) to populate NHD data at a local (1:5,000) scale, using Pueblo County-generated LIDAR. The county has numerous water-related projects that his office supports – the largest of which relates to management of the temperamental Fountain Creek corridor. The network and unique reach code ID functionality of NHD are two of the most beneficial aspects of the dataset to us. Having this data available at a high resolution is extremely helpful.

Others with the correct answer (in order received) were: Michael Wiedmer, Richard Patton, Jim Sherwood, Calvin Meyer, Ken Koch, August Froehlich, Ed Carter, Dave Straub, David Asbury, and Jerry Sullivan. Elephant Butte Reservoir is the largest reservoir and state park in New Mexico. This reservoir gets its name from a volcanic cone which forms an island in the center of the reservoir which resembles an elephant's head. The reservoir can hold 2,065,010 acre-feet of water from a drainage area of 28,900 square miles. It provides irrigation to 178,000 acres of land.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography52.pdf>. This is obviously Niagara Falls. The image was made by importing the NHD into Google Earth. There are two parts to the quiz: First, what direction is the view looking towards. Second, what is the blue line in the middle of the left channel and why isn't there one in the right channel? Send your guess to jdsimley@usgs.gov. Thanks to Kathy Isham for the quiz.

Upcoming NHD Training

Maintenance:

January 12–15, 2010: Trenton, N.J., Contact David Anderson (danderson@usgs.gov) or Craig Coutros (craig.coutros@dep.state.nj.us)

January 19–22, 2010: Concord, N.H., Contact David Anderson (danderson@usgs.gov) or Greg Barker (Gregory.Barker@des.nh.gov)

Conflation:

June 2–4, 2010: Manhattan, Kansas, Contact Tim Hines (thines@usgs.gov) or Ingrid Landgraf (imlandgraf@usgs.gov)

Applications:

March 22, 2010: New York City, N.Y., Contact David Anderson (danderson@usgs.gov) (This event subject to change.)

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 Marshall Creighton, Ariel Bates, Steven Daw, Karen Hanson, Keven Roth, Michele Cutrofello, Pierce County-Washington and Kathy Isham.

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

You can view past NHD Newsletters at http://nhd.usgs.gov/newsletter_list.html

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