USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

NHD Progress

As the Federal Government concludes its 2006 Fiscal Year at the end of September, the U.S. Geological Survey is reporting that 91-percent of the high resolution National Hydrography Dataset is now available to the public. To see a status map, go to ftp://nhdftp.usgs.gov/NHD_Status /Sept_06_Status.pdf

Streamgage Indexing

The U.S. Geological Survey is in the process of indexing USGS streamgages to the high resolution NHD and making these available in the NHDPointEventFC feature class in the NHD. Indexing means that the gages have a network address coded using the ReachCode and Measure found in the NHD. This is used to analyze the position of the streamgage on the nation's hydrography network. The streamgages used in the process were originally indexed to the medium resolution NHD. This involved a careful quality assurance process to ensure the proper gage location. The current high resolution indexing effort uses these gage locations and then snaps the gage to the high resolution NHD. The quality of these gage locations relies on the correlation between the high resolution and medium resolution geometry. A more precise location of the gages will occur through data stewardship. To see a status of this effort, go to ftp://nhdftp.usgs.gov/NHD_Status /Gage_Stat_09_27_06.pdf. To learn more about the NHDPointEventFC feature class, see the April 2006 edition of the NHD Newsletter.

StreamStats update

The StreamStats servers have been moved to a new location to provide better service. Initial trials indicate that user speeds improved as much as four times over the old server configuration. StreamStats is publicly available for Idaho, Washington, Vermont, and Pennsylvania. An additional five sites are in internal testing awaiting approval to go public. These are Tennessee, Colorado, Delaware, Connecticut, and Oregon. For more information about StreamStats, go to http://streamstats.usgs.gov/

Update on NHDPlus Availability

The NHDPlus team at the U.S. Environmental Protection Agency and the U.S. Geological Survey has announced that all hydrologic regions of the United States are now complete with the exception of Regions 09-Souris/Red/Rainy and 20-Hawaii. Hydrologic Regions 19-Alaska and 21-Puerto Rico/Virgin Islands are not a part of the NHDPlus program at this time. To learn more about the NHDPlus, go to http://www.epa.gov/waters/ and click on NHDPlus.

ESRI User Conference – Indexing Dams to the NHD

Jeff Simley of the USGS gave a presentation on Indexing Dams to the NHD at the 2006 ESRI User Conference in San Diego. The source data for this project came from the U.S. Army Corps of Engineer's National Inventory of Dams database publicly available. The test project focused on two high resolution subregions in Colorado. The applicability of the NID to the high resolution NHD varies widely. About 10-percent of the dams correlated to the NHD very well, but needed minor adjustment within 100 feet. 60-percent of the dams needed minor adjustment up to 300 feet, which could be performed with minimal effort. 25-percent of the dams required extensive research, and 5-percent of the dams appear to be blunders with no evidence of a dam on recent orthoimagery. Of the dams that needed extensive research, about half of these could be correlated with the NHD. Overall about 20-percent of the dams could not be

correlated to the NHD. This is an expected result since the high resolution NHD is limited to 1:24,000-scale content. These particular dams tended to be minor structures. The purpose of indexing is to derive a network address for the dam. This is done by snapping the dam to the nearest NHDFlowline and obtaining the ReachCode and Measure at that location. Since most dams are associated with a waterbody, the dam snapped to an artificial path about half the time and to a stream/river the other half of the time, as expected. A policy on whether the dam should be associated with the waterbody's artificial path or the downstream stream/river is open to debate. It was found that many larger waterbodies show two outflow paths in the NHD. One is the main discharge gate through the dam, and the other is the spillway path over or around the dam. To effectively use dams as barriers to navigation, the single NID dam normally placed on the main path needs to be augmented with a pseudo dam on the spillway. Overall it appears that the NID would be an effective source of dams as indexed events for the NHD. The study was coauthored by Bill Smith of the USGS. See ftp://nhdftp.usgs.gov/Stewardship/NHD_Dams.ppt

The Value Added Attributes – Part 2
The July 2006 issue of the NHD Newsletter introduced the concept behind the Value Added Attributes in the NHDPlus dataset and discussed several of the attributes related to the hydrologic sequence number. This time the Newsletter will explore the VAA's related to stream level. Stream level is a long-standing component of the NHD model, but has not necessarily been implemented in the current high resolution program. Basically stream level (Stream Level) is designed to enable an upstream navigation to follow the main path of the river network. Stream level is assigned beginning with a terminal flowline, such as a river flowing into the ocean, and proceeding upstream. The starting level for flowlines that terminate at the oceans is a "level 1". Flowlines that terminate at the Great Lakes are a "level 2." Flowlines that terminate at the international boundary are a "level 3", and flowlines that terminate at any other place (isolated drainage) are a "level 4."

For example, the Mississippi River terminates at the Gulf of Mexico. The flowlines that trace the main flow of the Mississippi River, from the Gulf to the headwaters, are assigned a stream level of "level 1." The flowlines that trace the main flow of each tributary to the Mississippi River (such as the Ohio/Monongahela Rivers) from their termini on the Mississippi River to their headwater, are assigned a "level 2." The flowlines that trace the main flow of each tributary to the "level 2" tributaries (such as the Tennessee River, which is a tributary to the Ohio/Monongahela Rivers) from each mouth on their "level 2" tributary to the headwaters, are assigned a "level 3."

An attribute called the Divergence Flag (Divergence) does for downstream navigation what stream level does for upstream navigation, it enables a downstream navigation to follow the main path. Where a flowline diverges downstream into two flowlines, the code "1" is the main path, and the code "2" is the secondary path. If there is no divergence, the code is set to "0". Now that the main path is known looking both upstream and downstream, several additional value added attributes are calculated.

The Downstream Level (DNLevel) is assigned the stream level of the downstream main path flowline. Using level in conjunction with hydrologic sequence number can produce additional indicators. Level Path Identifier (LevelPathI) identifies the hydrologic sequence number of the most downstream flowline on the same level. For example, all flowlines on the main path of the Missouri River would code this attribute with the hydrologic sequence number of the very last flowline of the Missouri River as it empties into the Mississippi River. If desired, this could be used as a unique stream I.D. The Downstream Level Path ID (DnLevelPat) provides the Level Path Identifier for the very next main path flowline. Alternately, the Upstream Level Path Identifier (UpLevelPat) identifies the Level Path Identifier for the very next upstream main path flowline.

Why are all of these attributes needed? They basically make it possible to use SQL queries to select flowlines upstream or downstream, and choose either main paths or all paths. Upcoming editions of the

NHD Newsletter will discuss these methods. To find out more about the NHDPlus and its VAA table, go to http://www.epa.gov/waters/ and click on NHDPlus. Then click on the NHDPlus User Guide.

Answer to August Hydrography Quiz / New September Quiz
Jennifer Sharpe of the USGS Illinois Water Science Center was the first to correctly guess last month's hydrography quiz ftp://nhdftp.usgs.gov/Quiz/Hydrography15.pdf as the headwaters of the Missouri River. Jennifer says: "The clues given in the newsletter made me zero in on this quickly. There aren't that many places in the U.S. where rivers flow from south to north. The meandering nature of the rivers also led me to more arid locations. I figured it was the Missouri River headwaters even before I really looked. I used Google Maps to find the exact spot: the center being Three Forks, Montana". Jennifer works for the Water Resources Discipline at the USGS Illinois Water Science Center (IWSC) in Urbana, Illinois. She is currently developing multiple data layers in support of the Illinois StreamStats project. The final StreamStats product will be available online and will allow users to delineated drainage basins for which they will be given basin characteristics and regional equations for flood-frequency estimates. She also provides GIS support for the various hydrologic studies conducted through the IWSC.

For the August quiz look at ftp://nhdftp.usgs.gov/Quiz/Hydrography16.pdf. Can you identify where this is? The dark blue lines are major rivers; the blue lines are more minor rivers and streams; the black lines are connectors; and turquoise lines are canals. How many major rivers do you see, two or three? This is on the same theme as last month, the convergence of major rivers. Note the general sparseness of hydrography around the confluence. What causes sparseness in the NHD, but not necessarily in nature? Send your guess to jdsimley@usgs.gov.

Current USGS NHD Data Stewardship Contacts
Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut, Rhode Island, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Puerto Rico, and Virgin Islands – Carl Nelson cwnelson@usgs.gov

Michigan, Indiana, Ohio, Kentucky Tennessee, Minnesota, North Dakota, South Dakota, Nebraska, Wyoming, Montana, Idaho, Washington, Oregon, Alaska – Paul Kimsey pjkimsey@usgs.gov

Wisconsin, Illinois, Iowa, Missouri, Arkansas, Kansas – Tim Hines thines@usgs.gov

Louisiana, Texas, Oklahoma, New Mexico, Colorado, Utah, Arizona Nevada, California, Hawaii, Guam, American Samoa – Bill Smith wjsmith@usgs.gov

Upcoming One-Day NHD Application Workshops
St. Cloud, Minnesota – October 4, 2006. Contact Ron Wencl at rwencl@usgs.gov.
Helena, Montana – October 23, 2006. Contact Sibyl Govan at sgovan@mt.gov.
Bismarck, North Dakota – October 25, 2006. Contact Bob Nutsch at bnutsch@nd.gov.
Phoenix, Arizona – November 12, 2006. Contact Keri Mich kmich@fs.fed.us.
Corvallis, Oregon – November 13, 2006. Contact Nancy Tubbs at ntubbs@usgs.gov.
Salem, Oregon – November 14, 2006. Contact Nancy Tubbs at ntubbs@usgs.gov.
Olympia, Washington – November 16 & 17, 2006. Contact Sam Bardelson at stbardelson@usgs.gov.
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