

USGS National Hydrography Dataset Newsletter
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The NHD in *The National Map*

The hydrography theme now available in *The National Map* viewer is principally based on the National Hydrography Dataset. To view the data go to <http://nationalmap.gov/> and click on [View Maps](#) and then [Go to *The National Map* Viewer](#). At very small scales you will only be able to view National Atlas 1:2,000,00-scale streams, but once you zoom-in to about 1:100,000-scale you will be able to select NHD themes. You will find three sets of themes, each containing five feature classes. The three themes are high, medium, and local resolution NHD data. Each of these then contain five feature classes: (1) NHD Flowlines – the linear hydrographic network with reach ID's, (2) NHD Waterbody – lake/pond and marsh/swamp polygons with reach ID's, (3) NHD Point – non-reach point data such as springs, (4) NHD Line - non-reach linear data such as flumes, and (5) NHD Area - non-reach polygons such as double-line streams. The medium-resolution data is available for the entire country except Alaska. The high-resolution data is available for about two-fifths of the country (see NHD Status for availability), while the local-resolution is only available for Vermont. Other non-NHD hydrography themes may be available from various other sources such as wetlands, streamgages, wells, etc. At the present time, downloading must be done from the NHD website <http://nhd.usgs.gov>.

Streamgages Linked to the Hi-Resolution NHD in Utah

All of the U.S. Geological Survey streamgages in Utah have been reach indexed to the 1:24,000-scale National Hydrography Dataset. Since Utah has almost complete coverage of the high-resolution NHD, it is an excellent example to prototype this process. Reach indexing the streamgages means that they now have an address on the hydrologic network similar to a house address on a street. The “street” is identified with a unique 14-digit identifier for the reach. The “house address” is the location upstream on the reach starting with a value of 0 and ending at 100. By indexing the streamgages to the reaches, it is now possible to work with the streamgage as a part of the hydrologic network, rather than just a point in x-y space. It is therefore possible to quickly determine the upstream reach identifiers, the number of miles of upstream reaches, the stream distance to the next downstream gage, the surface area of all upstream lakes, the names of all named streams and lakes upstream, and other network operations. As more data is indexed to the NHD, more calculations can be performed. For example, at present it is possible to determine all 303(d) impaired waters upstream or downstream of the gage using data indexed by the Environmental Protection Agency. In the future, it may be possible to identify all agricultural ditch diversion gates upstream of a streamgage. In addition to creating the network address, the streamgage position is also correctly located. This also involves “snapping” in x-y space so that it is located directly on the correct stream or the correct channel of a braided stream. To perform the operation, a GIS analyst prepares the streamgage data from the National Water Information System and the NHD. Then they initiate an automated conflation program. When complete, the analyst then brings in additional reference layers to the GIS and calls upon a hydrologist or hydrologic technician familiar with the gage to verify the position. Corrections are made interactively as necessary. The final product is both a reach index database and a shapefile of corrected and verified streamgage positions. These can then be imported to other GIS systems. The reach index database can also be used with a flow table outside of a GIS environment for network calculations. Metadata is also produced for the operation.

The Geodatabase Conversion

As promised in the last NHD Newsletter, the mid April conversion of the NHD to the Geodatabase model did happen, and it did work! Only a few problems have been noted and are being addressed. Overall, the conversion has been huge success. If you note an issue of importance, send it to nhd@usgs.gov.

New NHD Toolkit for Arc and Shapefile Users

An upgraded NHD ArcView Toolkit will become available in late May to allow NHD users to utilize the new NHDGEOinARC model in ArcView 3.x. Note that this particular toolkit does not work on the NHDinGEO geodatabase data, but rather the Arc coverage data. It also works on shapefiles created from the new Toolkit. This software is being provided by the Environmental Protection Agency to allow the Nation's hydrography community to continue working with the GIS tools they are accustomed to, but take advantage of the latest available data in the Arc coverage format derived from the NHD Geodatabase model. Users will soon be able to obtain the software from the NHD website at <http://nhd.usgs.gov/tools>. The current toolkit is composed of 5 tools: (1) conversion to a shapefile - NHDArc2Shp, (2) setting-up the workspace - NHDLoad/Unload, (3) hydrographic navigation - NHDNavigate, (4) linking attributes - NHDRIT, and (5) editing tools for production centers – NHDEdit. The new toolkit will address: (1) conversion to shapefile - NHDGEOARC2Shp - in testing, (2) setting-up workspace - NHDGEOLoad/Unload - in testing for both NHDGEOinARC and NHDGEOinShape, (3) hydrographic navigation - NHDGEONavigate - being converted. The absence of delta_level in the dflow table does not allow correct upstream/downstream main path navigation. Also, NHD Navigate will not be able to navigate across workspace boundaries. This situation will be revisited as more development takes place, (4) linking attributes – not addressed at this time, and (5) editing tools for production centers - NHDGEOEdit - being converted to work on both NHDGEOinARC and NHDGEOinShape workspaces. Note that this particular editing tool is currently only distributed to a limited set of data producers and stewards.

The NHDGEO Edit Tools

A new set of NHD editing tools known as the NHDGEO Edit Tools will become available to the public. These NHD in Geodatabase tools are being developed in an effort involving the U.S. Forest Service, the U.S. Geological Survey, and ESRI. The primary purpose of the tools is to allow NHD users to perform spatial and attribute maintenance of the NHD in the NHDinGEOmodel. This will meet many of the editing needs of NHD users who have found that enhancements are needed in the NHD to make the data more fully suitable to their GIS analysis. The NHDGEO Edit Tools will be available to all users from the NHD website. Look for an availability announcement at the website and an upcoming NHD Newsletter. Documentation will also be available in the future. It is hoped that NHDGEOEdit Tools training will be available. At present, there are still several things left to be completed on the tool, including: incorporating many feature to feature relationship rules, making the tools work against SDE data, ensuring that all of the metadata tracking is occurring, and testing the extraction of edits and uploading into the NHDGEO database. Both the NHDGEOEdit Tools and the new ArcView Toolkit will include a reach code allocator that will allow the data steward to create new NHD reaches.

Geographic Information Systems and Water Resources

Several USGS scientists will speak at the American Water Resources Association's 2004 Spring Conference on GIS and Water Resources April 17-19 in Nashville, TN. Papers being presented by the USGS will discuss the use of hydrologic modeling for streamflow prediction, water pollution modeling, and the role of geospatial data provided by the USGS to support the modeling and reporting of the Nation's water resources. A number of USGS databases of such as the National Hydrography Dataset and National Elevation Data serve as key inputs to a new generation of hydrologic modeling systems based on GIS technology. The USGS works in close cooperation with other government agencies, industry, and academia to jointly advance the application of geographic information systems to solve water resource problems. Many additional papers that focus on USGS developed data and modeling techniques will be presented by partnering organizations.

NHD Status

To find out the status of NHD production, go to <http://nhd.usgs.gov>. Click on Data and then Go To the NHD Viewer, then click on NHD Status and redraw the map or zoom-in. To interrogate, click on the NHD Status radio button to make status active and use the identify function. The April status will be updated on May 10. You can also view the NHD status from *The National Map* viewer.

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