USGS National Hydrography Dataset Newsletter
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By Jeff Simley, USGS

National Park Service Joins NHD Partnership

The National Park Service, a longtime partner in producing Digital Line Graph-Hydrography for the Nation, has now signed a formal agreement with the USGS to share in the development of the high-resolution National Hydrography Dataset for coverage over National Park Service lands.

Linear Referencing in the NHD

One of the principal characteristics of the NHD that makes the dataset attractive to scientists is the ability to spatially reference scientific data to the hydrography. Using the NHD event model, data is georeferenced similar to a street address, with a "reach" (segment) of water acting as the street, and the "measure" acting as the house number. The scientist can locate data anywhere on the NHD network and create a specific address. The data can be (1) a point, such as a water chemistry sample, (2) a line, such as a stream classification, or (3) an area, such as fish species in a lake. The advantage of referencing data this way, as opposed to keeping the data in a spatial theme, is that database processing can be performed more efficiently. This doesn't make a big difference for a few dozen events, but for USGS partners such as the U.S. Forest Service and the Environmental Protection Agency, with thousands or millions of records, it's the difference between staring at a web page for ten minutes or two seconds. Similarly, imagine if your postman had to deliver a letter to 105 deg. 34 min. 27 sec. West and 39 deg. 36 min. 14 sec. North rather than 2185 South Hoyt Ct. in Denver, Colorado, the delivery process would be more complicated due to sequencing. When the NHD was invented, an adequate linear referencing system was not readily available, so the "reach/P-measure" event system was created specifically for the NHD to give it the needed power. Now, just as ArcGIS networking will vastly improve NHD networking, new technology will also advance linear referencing. ArcGIS 8.3 will introduce a robust linear referencing system that will help advance NHD linear referencing. The NHD-in-Geodatabase will still use an event table and the reach/measure, just as in NHD-in-Arc days, but new database processing technology and the new "M-measure" system will provide more speed, more options, more web access, and more analysis tools to an already powerful system to integrate scientific data into the NHD.

The NHD Reach Address Database (RAD)

The Environmental Protection Agency has developed the NHD Reach Address Database (RAD) to store the location of over three million events on water quality. These events are spatially referenced using the NHD linear referencing system where point, line, and area events are given an address on NHD reaches. The RAD stores only locational information for the events while the rest of the program information about each event, such as designated use, monitoring results, assessment scores, or impairment type, remains in the program database. Each event has a unique identifier called a Program System ID. Computer mapping tools like Geographic Information Systems (GIS) use the Program System ID to link spatial shapefiles from the RAD to their corresponding attribute information in the program database. In examining a record in the RAD, you will find fields for: (1) Event ID, (2) the NHD Reach, (3) a position on the Reach – P-measure, (4) a Program, e.g. 303(d) [Listed Impaired Waters], (5) a Value – may be blank, (6) an Entity ID – the Program System ID - a key value to an external database storing detailed information about the event, (7) State, (8) Metadata ID, and (9) A couple more fields of related information. The Program System events include: (1) 303(d), (2) 505(b), (3) Water Quality Standards, (4) Beaches, (5) Drinking Water Intakes, (6) Fish Advisories, (7) Grants Reporting and Tracking System, and (8) No Discharge Zones. An advantage to such a system is to provide a simple and efficient web interface to allow the public to easily access the data recorded by the EPA. This is done with

Enviromapper for Water http://www.epa.gov/waters/enviromapper/index.html, which displays a map of the U.S. allowing the user to zoom into an area of interest and view the hydrography symbolized according to the values linked to the RAD. It is also possible to download a snapshot of the RAD in the form of a shapefile to use directly in a GIS. This data is organized by (1) 303(d) Listed Impaired Waters, (2) 305(b) Water Quality Assessments, and (3) Water Quality Standards. Read more fully about the RAD at http://www.epa.gov/waters/about/rad.html including a good description of the use of the NHD by clicking on Geography. You can download the data by clicking on Data.

Highlights from the 2003 ESRI Conference – III

Ask WATERS: Correlating Water-Based Information Across Geography – Jonathan Markowitz
A new tool coming to the Environmental Protection Agency (EPA) is Ask WATERS, a flexible query methodology that allows correlation of disparate EPA Program Data. Ask WATERS will generate cross-program calculations and provide insight to overlaps between programs. The underlying integration roadmap is the EPA's Reach Address Database (RAD), which employs the NHD as the spatial framework for linking the Program Data. Utilizing geographical relationships expressed in the RAD and indexed events, the data sources can be correlated to answer questions about the health of and threats to water resources. An example was presented of how Ask WATERS could be used to assist decision-making with regard to the relationship between Water Quality Standards and Drinking Water Intakes.

NHD Newsletters on the Web

Copies of past NHD Newsletters are available on the NHD website at:
http://nhd.usgs.gov/newsletter_list.html. An index of all past articles is attached.

Upcoming NHD Training

September 9-11, Tallahassee, FL. This is a three-day conference booth exhibition featuring live demonstrations addressing customer requirements. Sponsored by the Florida Government Technology Conference. Instructor: Jeff Simley jdsimley@usgs.gov. Also contact Julia Giller jgiller@usgs.gov.

October 1 & 2, Denver, CO. GIS in the Rockies. All-day workshops covering all the basics of using and applying the NHD. Instructor: Jeff Simley. http://GISintheRockies.org/

States With Full Coverage Planned

The last NHD Newsletter noted that Massachusetts is planned for statewide coverage. Actually we meant to say Connecticut. Massachusetts is not currently planned while Connecticut has just signed an agreement with the USGS.

Recent Completions

Mark Twain NF (MO), St. Francis NF (AR/MO), Talladega NF (AL), Bankhead NF (AL), Francis-Marion NF (OH), White River NF (CO), San Juan NF (CO), Chugach NF (AK), Kisatchie NF (LA), Sawtooth NF (ID), Helena/Gallatin B Project, (MT), Utah 01 IP Project (UT), Salt Creek Project (NE), South Grand Project (MO), Winooski Project (VT), Sweetwater (WY), and Little Snake (WY).

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