Event Feature Classes Now Part of the NHD

Two new feature classes have been added to the National Hydrography Dataset model in addition to the original six. These two new feature classes are designed to store data which users prefer to treat both as events and as features. By treating the data as an event, it has an address on the surface water network using linear referencing. This makes it possible to search for these events using flow navigation queries. In addition, these data can also be handled as features for traditional GIS mapping. The new point event feature class NHDPointEventFC will be populated with streamgage locations for active and historical gages. A streamgage is important in GIS analysis not necessarily by its position on the landscape, but rather its position within the stream network. The position of the streamgage on a double-line river will be found in the middle of the river represented by its artificial path. About 23,000 USGS streamgages will be referenced in NHDPointEventFC. Soon, dams found in the U.S. Army Corps of Engineers National Inventory of Dams will also be referenced as events in the NHDPointEventFC feature class. The second new feature class is NHDLineEventFC. It works in the same way, but instead references a segment of the stream network rather than a point.

Within the NHDPointEventFC feature class you will find various fields that describe the event/feature. The two critical pieces of information are (1) the Source_FeatureID that provides an ID value that will allow you to identify the event/feature, and (2) the ReachCode/Measure that provides the address of the event/feature. Then there are some important fields that allow you to find more information about the event: (3) EventType describes the event/feature such as Gaging Station, (4) FeatureDetailURL provides a web link to access detailed streamgage data, (5) Source_Originator tells us the agency responsible for the event/feature, and (6) Source_DataDesc tells us the source of the event/feature such as NWIS. Additionally you will find (7) ReachSMDate describes the date of the reach used for the address, (8) ReachResolution identifies which database the reach came from, (9) ComID identifies the NHD key number for the record, and (10) the EventDate marks the time the event/feature was made.

The first subregion available with streamgage populated NHDPointEventFC data can be found in hydrologic subregion 1601 available at ftp://nhdftp.usgs.gov/SubRegions/High/NHDH1601.zip. Try downloading this NHDinGeo file into ArcMap and explore the NHDPointEventFC feature class. You will find that you can use the Identify function in ArcMap to click on a streamgage and automatically link to the National Water Information System for that gage.

The Importance of Change Management to the NHD – Part II

As discussed last month, the National Hydrography Dataset uses a change management system that helps make it a cutting-edge GIS model. The change management that the user can utilize consists of five characteristics of change. (1) FDate – Every feature in the NHD, that is every record in the database, has a field that identifies the latest date of that feature. If a feature created on 06/14/2001 was later edited, the subsequent NHD available for distribution would then include the new edited feature with a new date of say 03/27/2006. (2) NHDMetadata – A table is included with the NHD data that lists the processes that have been applied to the dataset. A record of metadata may apply to all of your data or just some of your data, even just one feature. The link between your NHD features and the metadata is accomplished by a cross-reference table called the NHDFeatureToMetadata table. It lists the ID number of each feature and provides you with the corresponding metadata record ID numbers that apply. Thus if you have a stream with an ID of 6458027, it might tell you that this feature has applicable metadata records of 2, 539, and 174278. The corresponding metadata record 174278 might tell you that Jeff Simley of the USGS edited

this feature on 03/27/2006 because the stream has new geometry. It's also possible that this metadata record likewise applies to features 6458028 and 6458029. So the NHD actually has metadata down to the feature level.

Additionally, change management uses (3) NHDReachCrossReference – A table that allows the user to track the history of ReachCode's used in the dataset. You may recall that features or groups of features have permanent identifier codes known as the ReachCode which is used to link scientific information to the NHD. Through the editing process, it may be necessary to replace an existing ReachCode with a new one. But since scientific data may have been associated with the old ReachCode, the user must be informed of the new ReachCode that takes its place. The ReachCrossReference table lists the old ReachCode, its creation date, the corresponding new ReachCode, and its creation date, and why the change was made, such as "edited the data." You will also find that editing session listed separately in the metadata. (4) ReachSMDate – This is a field associated with ReachCode that tells us the date the ReachCode was created or spatially modified. This is used by the scientific data linked to the NHD known as an event. It warns the user that the event might be inadvertently moved if the NHD geometry changed. It works if the ReachSMDate for the event does not match the ReachSMDate in the NHD. The ReachSMDate in the NHD can be found in the NHDReachCode_ComID table.

Last month it was mentioned that the NHD records change management behind the scenes using SDE versioning. We can actually see the version number using (5) NHDProcessingParameters – This table lists the version of the master NHD database that was used to generate your NHD data. This version number is updated about twice a week. If you download data on Monday, and then download the same data on the following Monday, your two datasets will have different version numbers, although none of the data itself may have actually changed.

If you edit a stream, four things happen automatically: (1) the stream gets a new FDate, (2) NHDMetadata gets a new record and the NHDFeatureToMeatata link is updated, (3) if the ReachCode identifying the stream is replaced, a new cross-reference entry is made to NHDReachCrossReference, or alternatively if the stream is simply altered (4) the ReachSMDate in the NHDReachCode_ComID table is updated, and (5) the NHDProcessingParameter table gets a new version number.

These techniques help the NHD serve the long-term interests of the user by keeping good records of changes made to the data. It helps to avoid the common and expensive practice of having to throw out old datasets and creating new ones once the editing becomes unmanageable.

Answer to March Hydrography Quiz / New April Quiz

Steve Char was the first to correctly guess last month's hydrography quiz as the Finger Lakes region of western New York (see ftp://nhdftp.usgs.gov/Quiz/Hydrography10.pdf).   Steve works for the USGS in the Colorado Water Resources Center in Denver where he performs a variety of GIS and field related tasks in support of water-resource investigations. Others with the correct answer were Bob Marinaro, Dale White, Jim McDonald, Cele Morris, Susan Russell-Robinson, David Asbury, Bruce Nielsen, and Kevin Sweeney. The Finger Lakes are glacially formed lakes in upstate New York, mainly linear in shape, each lake oriented on a north-south axis. The longest, Cayuga Lake, is 40 miles from end to end, but never more than 3.5 miles wide, reminding early map-makers of the fingers of a hand. Considering their narrow width, both Cayuga and Seneca Lakes have a remarkable trait; they rival much larger Lake Ontario for depth, each more than 400 feet.

The April quiz goes international. Take a look at ftp://nhdftp.usgs.gov/Quiz/Hydrography11a.bmp.   Or if that doesn't work alternately try Hydrography11b.doc or Hydrography11c.jpg. Can you identify where this is? You need to name the country and city or nearby city. For extra credit name the river. Hint: Although this is something you might normally see in England, it is not in England. Send your guess to jdsimley@usgs.gov.

Upcoming NHD Workshops

Austin, Texas – May 1, 2006. 16th Annual Texas GIS Forum. Contact Claire DeVaughan at cdevaugh@usgs.gov.
Rolla, Missouri – May, 2006. Contact Ray Fox at rfox@usgs.gov.
Houston, Texas – May 9, 2006. Various NHD papers. American Water Resources Association. See http://www.awra.org/meetings/Houston2006/index.html.
Morgantown, West Virginia – May 16, 2006. Contact Evan Fedorko at Evan.Fedorko@mail.wvu.edu.
Camp Hill, Pennsylvania – May 17, 2006. 2006 Pennsylvania GIS Conference. Demonstration. Contact David Terrell at dterrell@usgs.gov.
Trenton, New Jersey – May 19, 2006. Contact Roger Barlow at rbarlow@usgs.gov.
Coeur d' Alene, ID – Summer, 2006. Contact Frank Roberts at fmroberts@cdatribe-nsn.gov.
Salem and Portland, Oregon – Summer, 2006. Contact Nancy Tubbs at ntubbs@usgs.gov.
Olympia, Washington – Summer, 2006. Contact Sam Bardelson at stbardelson@usgs.gov.
San Diego, California – August 7-11, 2006. ESRI User Conference. Various NHD papers.
http://www.esri.com/events/uc/.
New Mexico – September 11, 2006. Contact Gary Kress at gekress@usgs.gov.

Note: Between April and September 2006, classes in the NHD Geo Edit tool will be taught in Connecticut/New York (May 8), Delaware (May 10), Minnesota (May 22-25), Florida, Pennsylvania, and Wyoming – Contact Carl Nelson at cwnelson@usgs.gov. Classes in Kansas (June 5-8), Utah/Idaho (July 10-12), Nebraska, Alaska, and Montana - contact Paul Kimsey at pjkimsey@usgs.gov. Classes in New Mexico, Texas, and Colorado - contact Bill Smith at wjsmith@usgs.gov. Classes in Arkansas (September) - contact Tim Hines at thines@usgs.gov.

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The NHD Newsletter is published monthly. Get on the mailing list by contacting jdsimley@usgs.gov.
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Jeff Simley, USGS, assumes full responsibility for the content of this newsletter.