USGS National Hydrography Dataset Newsletter
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Selected Paper Highlights from the 2003 ESRI Conference – I

Super-Charging the National Hydrography Dataset With Computed Attributes – Cindy Mckay
These value-added attributes will be computed from the national medium-resolution NHD coverage by Fall 2003. For more information contact ldm@horizon-systems.com

I. Analysis: (1) Steam Order - Strahler steam order (headwater stream is a "1"), (2) Waterbody Identifiers – waterbody ID, (3) Upstream Miles – total miles that drain to a reach, (4) Distance to Sink – distance to network termination, (5) Drain Stream Level – used to determine upstream main path.
II. Navigation: (1) Link-Node Navigation – from/to node navigation, (2) Hydrologic Sequence Identifier – assures upstream reaches, (3) Level Path Identifier, (4) Terminal Identifier – ID's terminating reach, (5) Source/Sink Flag.
III. Display/Selection: Generalization – ordinal value that allows user to thin the network for simplified content display. Works on pre-calculated tabular values rather than spatial generalization algorithms. Provides for a quick and easy generalization process.

NHD Watershed: Tools and Applications – Pete Steeves
Using the NHD Watershed extension in the NHD ArcView Toolkit allows users to delineate watersheds from any point on a NHD stream reach network where related datasets have been preprocessed. A second extension is the NHD Basin Characteristics that allows users to summarize selected basin characteristics for the newly delineated watersheds. These tools have been used to estimate flood frequencies along ungaged stream reaches in Vermont and are being applied in Massachusetts, in batch mode, to assess their capability in estimating the point where intermittent streams become perennial in the headwaters of a watershed. The processes work best by burning the NHD into the NED to get better channels in the elevation data. Normally, Spatial Analyst is needed, but the process can be run without it. Future efforts will move the application to the NHD in Geodatabase. The development is also working closely with the ArcHydro development.

Integrating EDNA and NHD Datasets to Derive Catchments for Stream Reaches – Bruce Worstell
DEM-derived catchments are being are being developed for integration with the NHD. These catchment and watershed delineations are often required for research applications. Using the Elevation Derivatives for National Applications (EDNA) dataset provides important layers relevant to hydrologic applications. Techniques have been developed to integrate the flow routing schemes of EDNA and NHD to derive synthetic catchment delineations for NHD reaches. The EDNA and NHD are conflated so that the NHD can be used to govern the stream density from EDNA, which tends to be overly dense. This is done through (1) traditional conflation, (2) hydrologically driven, and (3) raster seeded catchments. Each method has advantages and disadvantages. In the future the Watershed Boundary Database will be employed. The EDNA layers are (1) Filled DEM, (2) Flow Direction, (3) Flow Accumulation, (4) Synthetic Streams, and (5) Synthetic Catchments.

The Reach Address Database (RAD): An NHD Based Water Systems Solution – Steve Andrews
The RAD Version 2 serves as a foundation for the spatial reference of water information in monitoring, remediation, use, planning, and prevention. It has been developed by the EPA Office of Water to aide permiters, planners, enforcement agencies, and interested stakeholders. It is a national database based on the medium-resolution NHD and consists of 9 NHD tables, 10 attribute tables, and 6 event layers. It is implemented in Oracle and again in SDE. The SDE application provides for spatial operations, while the Oracle application is suited for both database operations as well as spatial operations. Metadata is used

extensively. The RAD allows for the quick display and analysis of the relationships between water information. It uses a common indexing system based on the event - an instance of data addressed to a reach much like a street address. For the RAD to be successful, optimized queries must be developed. The future of the RAD will involve the new geodatabase model, multi-resolution data, and time series data.

Developing and Integrating Web Services for Georeferencing to the NHD – James Rineer
One way of georeferencing events and storing them in the RAD is to use a web-based tool using Arc-IMS called the Web-based Reach Indexing Tool known as Web-RIT. It can create, validate and update NHD reach indexes, coordinates and other locational data. To aide in this work, an Integrated Geospatial Database is used which will allow sources such as Digital Raster Graphics and Digital Orthophoto Quads to be employed. The Web-RIT gives users access to reach indexing without the overhead of using an interactive GIS session. See http://www.epa.gov/waters/webrit/ .

STREAMSTATS

A World Wide Web application has been developed to make it easy to obtain streamflow statistics for user-selected locations on Massachusetts streams. The Web application, named STREAMSTATS (available at http://ststdmamrl.er.usgs.gov/streamstats/), can provide peak-flow frequency, low-flow frequency, and flow-duration statistics for most streams in Massachusetts. These statistics describe the magnitude (how much), frequency (how often), and duration (how long) of flow in a stream.

The U.S. Geological Survey (USGS) has published streamflow statistics, such as the 100-year peak flow, the 7-day, 10-year low flow, and flow-duration statistics, for its data-collection stations in numerous reports. Federal, State, and local agencies need these statistics to plan and manage use of water resources and to regulate activities in and around streams. Engineering and environmental consulting firms, utilities, industry, and others use the statistics to design and operate water-supply systems, hydropower facilities, industrial facilities, wastewater treatment facilities, and roads, bridges, and other structures. Until now, streamflow statistics for data-collection stations have often been difficult to obtain because they are scattered among many reports, some of which are not readily available to the public. In addition, streamflow statistics are often needed for locations where no data are available. STREAMSTATS helps solve these problems. See http://ma.water.usgs.gov/publications/fs10400/ .

Recent Completions

Bighorn NF, Shoshone NF, Grand Mesa/Uncompahgre/Gunnison NF, Sierra NF, Stanislaus NF, Inyo NF, Lassen NF, Modoc-Femont NF, Plumas, NF, Toiyabe NF, Dixie NF, Ozark NF, Helena NF, Theodore Roosevelt NP, Kettle (MN) project.

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