USGS National Hydrography Dataset Newsletter
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**New York**

Considerable progress has been made in completing the National Hydrography Dataset for New York. This is in large part due to the cooperation of the New York State Department of Environmental Conservation (NYS-DEC) Division of Water, which has been working with the USGS since 1993 for the production of Digital Line Graph-Hydrography and the NHD. Much of the work is being done by the Division of Water GIS Section under work-share agreements with the USGS in which the State and the USGS share in the work. The USGS Mid-Continent Mapping Center is performing the quality assurance and databasing of the completed NHD. At the moment, the NYS-DEC has halted work as the State reviews its funding policies. With so much of the state already in production or complete, it is hoped that work can resume soon in order to complete the remainder of the state. New high-resolution orthoimagery is being produced by the New York Office For Technology for the Hudson Valley and the western part of the state. This may be used for enhancing the NHD if a funding partner can be found. The USGS, NRCS and Upper Susquehanna Coalition are also interested in the application of Elevation Derivatives for National Applications (EDNA) data for use in hydrologic modeling in New York. Please review the attached status graphic for a review of the status of the New York NHD.

**Titan Systems Corporation**

The production of the National Hydrography Dataset is an enormous task that requires a large consortium of federal, state, local, industry, and academic organizations to complete. An important component of this is the group of private industry contractors that have become a part of the NHD team. One of these companies is Titan Systems Corporation, which works under contract directly to the U. S. Forest Service and indirectly to the U. S. Geological Survey. Titan Systems has a long history of successful work for both Federal agencies and is a welcome partner in the NHD program. Titan's NHD operation is based in Portland, Oregon where a team of 18 GIS data specialists are dedicated to NHD production. This workforce is experienced in Geographic Information Systems and is well trained in the NHD program, giving them the capability to efficiently produce high quality sub-basins. They have worked through a steep learning curve and have now mastered many of the issues facing NHD production. Titan Systems uses the NHD Create software package, which is now fairly well refined and an integral part of Titan's NHD program. The bulk of Titan's NHD work has been producing sub-basins over National Forest Service Lands under the U. S. Forest Service contract. Another important part of Titan's work involves the production of NHD in Alaska. This has many challenging requirements stemming for the unique nature of Alaska NHD since medium resolution or RF3 data does not already exist. Titan Systems has been a pioneer in modern quality practices in cartography and is an ISO-9002 certified company, believing that this provides a solid foundation to their quality assurance efforts. The company has established a strong reputation in the national NHD effort and will likely find itself as an often-requested producer by numerous organizations. The Titan website is www.titangis.com.

**New Book on Arc Hydro**

Many people working on the National Hydrography Dataset have had only limited exposure to other hydrography datasets and hydrologic modeling. A new book, Arc Hydro – GIS for Water Resources, edited by David Maidment, provides an opportunity to broaden an understanding of these subjects. The 203-page book provides a clear understanding of Arc Hydro and comes with a demonstration CD. Both the EPA and the USGS contributed to the design of Arc Hydro and the future implementation of

geodatabase in NHD will follow the Arc Hydro model. The book also does an excellent job of explaining the basic concepts behind ArcGIS and geodatabase.

Chapter one discusses the concept of Arc Hydro as a "hydrologic information system" for the purpose of supporting hydrologic modeling. It promotes the idea that a contemporary GIS can offer much to better support hydrologic modeling. Chapter two notes the relationship of hydrography and hydrology, as a description of water and as a science dealing with the properties, distribution and circulation of water, respectively. It provides an explanation of both an inventory approach to water data modeling and a behavioral approach. The chapter then describes the network, geodatabase, and object modeling concepts behind ArcGIS. It then uses this foundation to introduce the reader to the basic data structure of Arc Hydro known as the Arc Hydro framework. Chapter three discusses hydrography networks with a thorough introduction of how ArcGIS handles networking and how Arc Hydro uses this approach. It explains how events, such as a water quality monitoring station, can be addressed on the network. Chapter four then steps away from ArcGIS to provide background on drainage systems in terms of various forms and hierarchy's of catchment units. It places a lot of emphasis on how digital elevation models are used to define the catchment units with a good explanation of grid operations. Chapter five then takes the reader on to the next step of understanding river channels. This emphasizes the morphology of channel cross-sections, and from a cartographer's point of view, creates a strong appreciation for the role of cross sections in hydrologic modeling. The role of triangulated irregular networks of digital terrain models in calculating cross sections is explained. Then a good discussion of how river channels are represented in Arc Hydro is provided. Chapter six explores hydrography, with an emphasis on how the National Hydrography Dataset can provide the hydrography source for Arc Hydro. Next, the reader is provided with the fundamentals on how the hydrography is represented in Arc Hydro. Chapter seven then introduces the reader to the dimension of time in hydrologic modeling. This discussion highlights the idea that a particular water variable is one of three dimensions of data, along with time and space. This construct then leads the reader to how time series of data are represented in Arc Hydro. From this, an example is given of how time can be used in hydrologic modeling using Nexrad precipitation data within the Arc Hydro environment. Chapter eight then talks about hydrologic modeling, again highlighting the role that GIS, and in particular Arc Hydro, now has in hydrologic modeling. The idea of intrinsic modeling using off-the-shelf tools, dynamic linked library using a library of hydrologic calculation routines, and independent modeling using and external modeling system, is explained. Finally in chapter nine, a step-by-step process is presented to implement Arc Hydro. Each chapter concludes with a layout of the applicable data dictionary.

**Recent U.S. Forest Service Completions**

The USGS Mid-Continent Mapping Center has completed the George Washington and Jefferson National Forest project consisting of nine sub-basins, the Daniel Boone NF project consisting of nine sub-basins, the Shawnee NF project consisting of six sub-basins (in cooperation with the State of Missouri), the Finger Lakes NF project consisting of one sub-basin (in cooperation with the State of New York), and the Oconee NF (although not a complete administrative unit) consisting of two sub-basins (in cooperation with the State of Georgia). The MCMC has also archived the Clearwater NF project consisting of nine sub-basins produced by Titan Systems for the USFS.

**Recommended Web Site**

An impressive application of the NHD can be found at the Environmental Protection Agency's EnviroMapper for Water web site http://www.epa.gov/waters/enviromapper/index.html

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