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North Carolina Stream Mapping Plan – Steve Strader

The State of North Carolina General Assembly placed a directive on the North Carolina Geographic Information Coordinating Council and the NC Department of Environment and Natural Resources to developed a plan to improve the mapping and digital representation of surface water. The plan is to include: (1) intermittent and perennial streams, lakes, and ponds (2) multi-agency participation, (3) mapping specifications and standards, estimated budget and schedule for statewide implementation, and entry of the data into NC OneMap, (4) encourage municipalities and counties to share the mapping and digital representation of surface waters that they have developed with the Geographic Information Coordinating Council, NC OneMap, and the public, and (5) present the plan to the General Assembly and the Environmental Review Commission in January 2005.

The resulting Stream Mapping Working Group represented by 35 city, county, regional, state, federal, academic, and private sector organizations has now submitted its findings and recommends implementation of five phases. Phase 1 consists of (1) completion of the ongoing 1:24,000-scale NHD data for North Carolina, (2) design and development of the geodatabase and software tools, and (3) continuing public education on the uses and purposes of the new statewide digital surface waters file. Phase 2 is the incorporation of the North Carolina Floodplain Mapping Program stream data. This will update the NHD from the 1:24,000-scale data to a higher resolution line work for the streams data layer. Phase 3 will extend the mapping created from Phase 2 upstream to the 20-acre drainage area requirement. Phase 4 will extend the mapping created from Phase 3 upstream to the 6-acre drainage area requirement. Phase 5 is the maintenance of the data beginning in the second year and beyond. This includes serving all data through the NC OneMap map server http://www.nconemap.com and through the NHD portal http://nhd.usgs.gov.

The total cost for the Stream Mapping Project is $16.2 million, consisting of $13.9 million in development cost and $2.3 million in maintenance cost over a five-year period. The project will leverage significant investments that have been made in LIDAR and aerial imagery within North Carolina. It will also benefit from years of development and testing of the NHD data models and tools. The potential end result of the plan is a statewide project leading to a digital surface waters file that can be effectively used and maintained by federal, state and local government agencies and can be easily accessed by the public. For more information, contact Steve Strader at sstrader@usgs.gov.

Exploiting the Power of the NHD

The NHD is much more than an ordinary GIS dataset because of two characteristics that work hand-in-hand with each other, the flow network, and linear addressing. Exploiting this powerful capability is much easier than you might think. With linear addressing we know where hydrologic events are located on the network. With the flow network we know the upstream/downstream relationship of these events. Thus we can use a GIS to find all of the water quality monitoring sites downstream from a permitted discharge at a factory. You can do this with even a limited knowledge of GIS…if you use the NHD. Here's how it works: First of all we will assume that you have downloaded the NHDinGEO and brought it up in ArcMap. You can do all of that by clicking your mouse about eight times. It couldn't be easier. Second, we will assume that you have loaded your linear addressed water quality monitoring sites and permitted discharges. If these sites have already been addressed, you're in luck, that's another six mouse clicks. If not, it's just an easy half-hour operation, which you will never have to repeat. Now for the real meat and potatoes: The secret is to relate the event (linear address) table to the NHDFlowline table. (1)

Go to the water quality monitoring station event table and set up a Relate to the NHDFlowline table on the ReachCode field. (2) Go to the permitted discharge of interest and navigate downstream. First, go to Analysis and Options and change the result to Selected Features, then solve the navigation. (3) Open the NHDFlowline attribute table. Click on Options and then click on Related Tables. Select the water quality monitoring station table. (4) The water quality monitoring table will open and the records of monitoring stations downstream from the permitted discharge will be selected. That's it! Using a simple set of out-of-the-box tools, you have easily conducted a powerful analysis. It works because we have addressed events on the hydrography network using the NHD reach code, and because we know the direction of flow for these reaches within the network. You can find an example of this on slides 45-48 of the powerpoint presentation mentioned below. For a more detailed set of instructions, contact jdsimley@usgs.gov.

Examples of NHD Use

A powerpoint presentation on the use of the NHD by various organizations around the Country is available for your use. It includes narrator notes for each slide. You can obtain the presentation at ftp://nhdftp.usgs.gov/Docs/. The filename is NHD at AWRA.ppt. The presentation is 47 megabytes.

High Resolution Development

Have you looked at the status of the high resolution NHD lately? Go to the NHD viewer at http://nhdgeo.usgs.gov/viewer.htm and click on the NHD Status arrow, check the High box, and Redraw Map. You will see that significant progress has been made in every State and Territory. There are just a few gaps in the coverage, most noticeably in the area within a 500km radius of Chicago in Wisconsin, Michigan, Ohio, Indiana, Illinois, and Iowa, although the immediate Chicago area is available. A few other gaps can be found in the Central Dakotas, Northern Montana, and Eastern Kansas/Oklahoma. The success shown on the status map is directly attributable to partnerships. Ninety-five percent of the NHD work is produced in partnership between the USGS and other organizations. In fact, the U.S. Forest Service has partnered on over 40% of the subbasins in the U.S. Many states also participate with statewide coverage programs. This has produced a solid foundation for NHD coverage across the country. Now the National Park Service, the Bureau of Land Management and many additional states are taking advantage of this foundation to coalesce much of the coverage into solid regional blocks that allow wide-area connectivity of hydrologic networks. The power of the NHD is multiplied as more of the Country is completed because each subbasin works together with its neighbors to extend the overall flow network. The water that flows through St. Louis, Missouri, for example, comes from 442 of the Nation's 2,256 subbasins. The study of this water will be all the more complete when these 442 subbasins are complete and events are addressed to them. Complete nationwide coverage of the NHD is an extremely powerful tool for science as we have seen in the completion of the medium resolution program in partnership with the Environmental Protection Agency. It has allowed the EPA to conduct analysis of the Nation's entire stream network as a whole to derive nationwide characteristics such as stream level. In 2006 we hope to achieve a similar milestone with completion of the high resolution coverage. The status map is a strong indicator that we are closing in on that goal.

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The NHD Newsletter is published monthly. Get on the mailing list by contacting jdsimley@usgs.gov.
You can view past NHD Newsletters at http://nhd.usgs.gov/newsletter_list.html
Jeff Simley, USGS, assumes full responsibility for the content of this newsletter.