

USGS National Hydrography Dataset Newsletter
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NHDGEO ArcView Toolkit Availability

The NHDGEO ArcView Toolkit is ready for use and will be added to the NHD website for distribution shortly. Check <http://nhd.usgs.gov/> for actual availability. The NHDGEO ArcView Toolkit is a collection of ArcView extensions provided to assist in the understanding and use of NHD data in the NHDGEOinARC data model. This version of the Toolkit will not work with data in the NHDinARC data model. The Toolkit components are designed to be easily incorporated into user-developed, ArcView-based NHDGEOinARC applications. Currently, the Toolkit contains: (1) NHDGEO Load/Unload Workspace, which loads, symbolizes and displays the themes and tables in one or more NHD workspaces, (2) NHDGEO Navigate which supports the upstream and downstream navigation of the drainage network, and (3) NHDGEO Reach Indexing Tool which provides an interactive environment for creating point, line and area events linked to NHD reaches. The NHDGEO ArcView Toolkit runs under ArcView 3.2 (or higher) on Windows 95, 98, NT, 2000, or XP. This version of the toolkit does not work with ArcView 8.

NHD Stewardship in Colorado

A meeting of the Colorado Water Resources GIS Consortium, attended by twenty-eight GIS experts representing interests in GIS hydrography for the State of Colorado, met on January 6, 2005, to discuss the role of NHD and stewardship of the NHD. Like many states, GIS analysis in Colorado has traditionally taken advantage of a number of legacy hydrography databases from various agencies. The Consortium members believe that a common hydrography database for use by all agencies, including National-level efforts at USGS, BLM, NPS, EPA, and the U.S. Forest Service, is in the best interest of advancing their capabilities. The NHD can offer a common and widely accepted framework, techniques and tools, networked flow, a linear addressing capability, a maintenance strategy, and a stewardship program to implement long-term maintenance. Interest in hydrography in Colorado covers a wide range of users including State organizations such as the Colorado Water Conservation Board, the Colorado Department of Natural Resources, the Colorado Division of Water Resources, and the Colorado Division of Wildlife; regional water managers and providers such as the Northern Colorado Water Conservation District, the Colorado River Water Conservation District, and the Denver Water Board; local water providers such as the City of Greeley, the City of Aurora and other local entities interested in water management activities such as Douglas County; federal agencies such as the USDA Natural Resource Conservation Service, the USDA Forest Service, and the U.S. Geological Survey; and private organizations such as Riverside Technology Inc. and Destiny Resources.

Many of these groups are very interested in the streamflow/volume and water diversion time series readings that they would attach to the NHD once appropriate linear referenced point events (i.e. gaging stations and diversion structures) were made part of the NHD. It was agreed that a single entity should act as a primary steward to manage and coordinate activities, and interface with the USGS NHD program. However, despite various recommendations, no one agency emerged to take on the role. One idea that was floated and supported by the non-USGS contingent was to have the various agencies pool their money to fund a USGS person to act as principal steward. The advantage of this, particularly in light of Colorado's many water resource issues, is that a fully neutral organization could serve as an impartial adjudicator of hydrography mapping issues. No further decision has been made on this, but the USGS would be willing to serve in this capacity if it could secure outside funding. An organization such as the Colorado Division of Water Resources office could fill this role also, but this office is cautious about litigation concerns and about questions of required level of effort. The level-of-effort for this task was discussed with no definitive answer, but it was suggested that there would be an initial flurry of activity as

a backlog of updates was processed, and then taper down to routine maintenance. Perhaps a halftime or quarter-time person could do the job, with an initial high-level of effort tapering off later in the year. Clearly, the idea of a principal steward supported by a group of sub-stewards representing various interests is a favored approach.

There is no shortage of hydrography revision activity in Colorado. Some real estate is being revised by multiple agencies in duplicative efforts in response to individual agency goals. It was agreed that the NHD is very close to being of ideal 1:24,000-scale accuracy, but a certain level-of-effort was needed to make it fully suitable to applications. The idea of positional accuracy was addressed with various suggestions for improvement, but others pointed out that of principal concern are the content, the flow network, and the attributes, specifically the names. With regard to positional issues, it is necessary to be aware of the 1:24,000-scale parameters and not over-extend the capabilities of the high-resolution NHD. In some cases, particularly when dealing with half-meter or better orthophotography, it may be time to develop a 1:5,000-scale local-resolution database.

Ideas on implementing stewardship seemed to favor a “start small and get bigger with time” approach. Not spending too much time on final design, but rather to let ideas evolve based on the practical knowledge initially developed. Many called for documentation on stewardship. A draft memorandum of understanding for NHD stewardship with the USGS is available, and documentation of the NHDGEO Edit tool is forthcoming. Unfortunately, there is very little documented on stewardship because there is little precedent to follow. Colorado, along with a handful of other states is early in the conceptual design. The goals and objectives are quite clear, and the NHD is designed to follow the stewardship concept, with extensive metadata including feature level metadata, reach-based revisions, a transactional method for processing, permanent identifiers, feature dates, versioning capability, lineage tracing, and built upon a well-tested and rigorous model. With this established, it is likely that a stewardship process can be developed and evolve to a mature model with a minimum of risks. The widespread motive for a common, rigorous, applicable, and current hydrography database is the leading factor in assuring success.

NHD Stewardship in Connecticut

The USGS NHD program met with Connecticut’s Department of Environmental Protection (DEP) on January 19 and 20, 2005, to discuss the stewardship of the NHD. Also representing hydrography interests in the State were members of the USGS water discipline assigned to study Connecticut’s water. The DEP has agreed to consider being designated as the State’s principal steward to coordinate activities and review the suitability of edits. A conglomerate of sub-stewards, made up of any organization within the State actively involved in using the NHD, can then feed edits to a NHD steward point-of-contact in DEP, who will then serve as the interface with the USGS NHD program. It is anticipated that stewardship will include a series of steps involving maintenance of the NHD. The first of these steps will be a major review of the State’s NHD to assure it meets the objectives in applications. With this complete, the next step is follow-on maintenance to keep the data current and accurate. As the NHD is applied, users will stumble upon updates needed. One example of the first phase is the need to add connectors in the network to accommodate culverts in urban areas. Possibly, these steps will result in versioned baselines of the NHD to keep users in sync with the various stages the NHD as a living database.

Stewardship will require good program management to keep the community informed of status, including an active process of notification of change rather than a simple passive process requiring the community to inquire about changes. Because Connecticut shares a sizable portion of its subbasins with other states, good regional coordination will be necessary. Connecticut is currently engaged in the reach indexing of impaired and assessed water in the State. The USGS NHD program, the USGS Water Discipline, the Connecticut DEP, localized interests, and regional oversight will all play a strong and coordinated role in

stewardship. The USGS NHD program in particular will need to provide good leadership and support to assure that the stewards of the NHD will be set up for success. For more information see <http://dep.state.ct.us/> or contact Jon Scull at jonathan.scull@po.state.ct.us.

NHD Stewardship in New Hampshire

Hydrography users in New Hampshire gathered on January 21, 2005, to discuss the use of the NHD and plans for stewardship. The New Hampshire Geological Survey (NHGS) within the New Hampshire Department of Environmental Services will serve as the principal steward for the NHD within the State. This is where much hydrography analysis work is conducted. There is also a network of hydrography users in the State, including the University of New Hampshire, which is the State's principal producer of the NHD. Other users include state level agencies, town government commissions and boards, regional planning commissions, local river advisory committees and grassroots watershed organizations, Federal groups such as the Water discipline of the USGS, the U.S. Forest Service, the Natural Resource Conservation Service, and non-profit conservation organizations such as the Society for the Protection of New Hampshire Forests and the Nature Conservancy. Such organizations will supply the NHGS with recommended revisions and the NHGS will then provide a level of review before interfacing with the USGS. Stewardship will look at such issues as consistent density, network connectivity, and accurate flow direction. A goal will be to "purify" the network to assure that all flow reflects natural conditions by verifying the NHD model to ground truth. A backlog of updates is currently ready for input to the stewardship process, but overall there should not be a lot of change as the NHGS performed a significant amount of QA/QC during the initial phases of NHD development. One example of updates that still need to be made to the NHD involves the subdivision of NHD Waterbodies into individual polygons to attribute names for the various parts of lakes.

There is also strong interest in the use of reach indexing. The State has already indexed 5,200 point, line and area events of 305(b)/303(d) water using the NHDinARC Toolkit Reach Indexing Tool, and has plans to index a variety of other datasets including gaging stations, dams, water quality sampling stations, flow statistics, channel cross sections, and registered water withdrawals and returns, to name a few. Work is currently being conducted by the State to develop Strahler stream order, which will ultimately be indexed to the NHD as linear events. The New Hampshire Department of Environmental Services has 80 ArcView seats compared to 6 ArcGIS seats, so interest in the NHDGEOinARC is strong.

New Hampshire is implementing a similar strategy for maintaining its watershed delineations. The maintenance effort will also promote watershed boundary densification along with modifications to the existing level-6 hydrologic units. The goal is to provide a clearinghouse of watershed delineations for the state that have gone through a standard process of QA/QC.

NHD Stewardship will require support from the USGS for leadership, management, tools, procedures, and training. A good active system to notify users of revisions is needed and may include a registration process for the user community to receive notification of any updates to the NHD. The Delaware DataMil was seen as a good example as an input mechanism for the user community through a public comment page. You can find out more about the New Hampshire Geological Survey at <http://www.des.state.nh.us/Geology/> or contact Rick Chormann at rchormann@des.state.nh.us.

NHD Stewardship in Vermont

A variety of hydrography users in Vermont met with the USGS on January 24, 2005 to discuss the use of NHD in the State and outline plans for the stewardship of the NHD. Vermont is unique in that its principal Statewide NHD coverage is at 1:5,000-scale, having been compiled from half-meter Digital Orthophoto Quadrangles collected in the 1994-2000 timeframe. This NHD is stored in the Local

Resolution portion of the NHD database and as a result, stewardship will be oriented toward more advanced applications of the data. For example, Vermont is keying in on the perennial/intermittent classification of streams, which will be applied as an event theme once generated. Vermont's local resolution data currently classifies all streams as perennial, but a number of regulations will use perennial/intermittent classifications.

Vermont is also somewhat unique in that GIS oversight is handled by a State chartered non-profit organization, the Vermont Center for Geographic Information (VCGI). VCGI relies on income from selling its services to various agencies for over half of its funding, keeping it in the technological forefront of GIS work. This group will assume the role as principal steward. Other organizations, including Federal and state agencies, as well as regional planning commissions, will feed information to VCGI. It is clear that having the user community play an active role in stewardship will yield an outstanding database because they know the hydrography better than anyone, can find problems affecting their applications, and are motivated to do the work. The NHD in Vermont is already seeing strong use in applications. Of particular note is work being done by the River Corridor Management Program in the State's Department of Environmental Conservation for channel classification using a variety of data to characterize stream channels with their Stream Geomorphic Assessment tool. See <http://www.anr.state.vt.us/dec/waterq/rivers.htm>. Vermont will make extensive use of reach indexing in the NHD to address such things as bridge/culverts, dams, stream classification, and water quality. A new program will also calculate the Value Added Attribute fields available in the NHD to speed up advanced network operations, "thin" the network for display purposes and enrich analytical operations. VCGI currently uses hydrography data in the form of their own Vermont Hydrography Data (VHD), essentially a one-to-one reflection of the NHD in an Arc Coverage model. The State is in an Arcview 3.x environment because it can accomplish its work with the existing NHD Toolkit. A switchover to the NHDinGEO is contingent on availability of more advanced ArcGIS tools. For more information about VCGI, see <http://www.vcgi.org> or contact Mike Brouillette at mikeb@vcgi.org.

NHD Stewardship in Maine

A gathering of hydrography experts in Maine was held January 25, 2005, to discuss NHD stewardship. Interest in the NHD in Maine comes from such organizations as the Department of Environmental Protection, the Department of Inland Fisheries and Wildlife, the Department of Marine Resources, the Department of Human Services Drinking Water Program, Dam Safety Program, and the Department of Conservation. GIS activities in Maine are managed and coordinated by the Maine Office of GIS (MEGIS). MEGIS is part of the state's Office of Information Technology and is Maine's clearinghouse for GIS data. The Maine Office of GIS will act as the principal steward in the State, with assistance by a number of agencies that will contribute their knowledge, needs, and expertise to provide stewardship.

Although the NHD is needed statewide, a pre-conflation dataset is available for current use. Many state-based attributes, largely on polygons, are currently attached to this pre-conflation version. These will eventually need to be migrated to the NHD as reach indexed events. For example, the State uses a water feature identifier known as a "MIDAS number" upon which much data and regulations are based. Integrating this with the NHD will be a critical step. Reach codes are not available on the pre-conflation dataset. Maine, like many states, is also active in the mapping of 303(d) and 305(b) waters, which are indexed to the NHD reach codes. Maine has other hydrography datasets in use by various agencies in the State. All of these will eventually evolve into the use of the NHD as a data framework upon which to attach this vast wealth of data. Maine, like many states, would like to work off an SDE NHD database within the State. The exact mechanism for doing maintenance edits on such an enterprise SDE will be determined through USGS technical assistance. A number of edits to the NHD are anticipated, although the volume and nature of these edits is not yet well understood. However, Maine does have a lot of experience with hydrography maintenance of its current pre-conflation data layer and has produced a

document Standard Operating Procedures (SOP) for Maintenance of Statewide GIS Hydrography Database. MEGIS and Maine's Departments of Environmental Protection, Inland Fisheries and Wildlife and Marine Resources have signed an agreement implementing the SOP and making specific edit assignments. Agency edits are made on SDE versions that are subsequently reconciled by MEGIS to the central database.

Maine has an interest in integrating the hydrographic network in Canada to the NHD. It is possible to accomplish this through the use of a generalized network for affected Canadian waters, lacking the detail found in the NHD, yet suitable for modeling and analysis. Maine is also interested in the relationship between the NHD and the DFIRM program underway in FEMA. The high-resolution NHD for Maine is not yet complete, but significant progress is underway. For more information on GIS in Maine see <http://megis.maine.gov> or contact Dan Walters at Dan.Walters@maine.gov.

NHD Stewardship in Massachusetts

A number of key Massachusetts state agency personnel involved in the use of GIS in watershed management, natural resources and hydrology gathered on January 26, 2005, to meet with the USGS to discuss the stewardship of the NHD. GIS coordination and data availability in Massachusetts is handled by the Office of Geographic and Environmental Information, better known as MassGIS, part of the Commonwealth's Executive Office of Environmental Affairs. Members of this and other organizations involved in GIS in Massachusetts represented the interests of the Commonwealth. MassGIS will become the principal steward, with input coming from many sectors within the Commonwealth. The first priority is to complete the NHD for Massachusetts. MassGIS has created a hydrography layer with centerline and routing, derived from the 1:25,000-scale DLG's, but it is not complete for the state and the tools to use it are based in ArcView 3x. The NHD coverage that does exist in Mass. is the result of programs in the surrounding states, which were able to incorporate the earlier MassGIS work; much of the state has been or is being converted to NHD although some internal subbasins remain un-funded. It is intended that an SDE layer of NHD will become the principal source of hydrography for GIS users.

A number of water resource issues are of particular interest in the Massachusetts GIS community. One important goal is the linkage of NHD reaches to the 305(b) and 303(d) lists and the water quality records maintained by DEP. Watershed analysis tools are now being used to perform TMDL calculations using the existing centerline. There is also interest in the use of GIS to support stormwater management and the hydrography of urban areas, with strong interest in the addition of culverts to provide the proper flow through the metropolitan landscape. It is likely that the culverts will be coded as connectors in most cases, but pipelines could be used where precise location is known. Also of interest is the location of dams, particularly where there are opportunities to improve flow regimes or even restore natural flow. Coding these into the network provided by the NHD can improve the analysis of environmental impacts. In addition, there is strong interest in wetlands. MassGIS makes available a 1:5,000-scale wetlands layer, and although this will remain a separate layer from the NHD, the integration of the two will be important. Finally, the integration of NHD with the various levels of watershed geography – HUC codes 8 through 12 – will be an important platform for better watershed planning and policy development and the Water Assets and Water Budgets programs.

The details of executing NHD stewardship, such as who can edit the linework, have yet to be determined. Certainly, the NHDGEO Edit software will be an important tool and training on this software will be needed. Although disconnected editing, where data is checked-out and checked-in, is of interest, there is even stronger interest in synchronized editing, where a duplicate copy of the data can be edited with those edits automatically reflected in other copies on a daily basis. The use of a web application, where users can identify the location of a particular problem in the NHD, will likely become an important tool for Massachusetts GIS users. Integration of the NHD with ArcHydro is also of strong interest. For more

information about MassGIS, see <http://www.mass.gov/mgis/massgis.htm> or contact Christian Jacqz at Christian.Jacqz@state.ma.us.

High-Resolution NHD Available in Subregions

You can directly download high-resolution NHDinGEO data packaged by subregion from <ftp://nhdftp.usgs.gov/SubRegions/high/>. You can also access this data by going to the NHD viewer at <http://nhd.usgs.gov/data.html> and click on Staged Subregions at the bottom of the map. This repository is not yet complete, but many subregions are now available. Files are named using their subregion HUC-4 code. This data is networked for navigation and routed for reach indexing. However, not all network connections have been verified for some of the subregions. The USGS will be verifying these over the next couple of months.

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