

USGS National Hydrography Dataset Newsletter  
Vol. 1, No. 4, February, 2002  
By Jeff Simley, USGS

Medium Resolution (100K) News: The big news is that the last of 2,111 CU's was completed ("set to distribute" in NHD terminology) early in February. All flow validation is complete and the re-leveling process is 80% complete with the FOD loads keeping pace. Essentially, the conterminous U.S. now has a complete and fully integrated network of hydrographic data based on 1:100,000-scale mapping, save for a few final refinements. The re-leveling has to be completed and some improvements in several Vermont sub-basins are needed. However, the NHD was never intended to be complete. Maintaining, refining, and improving resolution of the NHD are never-ending tasks designed to make the NHD continuously up-to-date, applicable, and relevant to the Nation.

High Resolution (24K) News:

Alaska: The production of NHD in Alaska is considerably different than in the remainder of the U. S. The EPA did not produce RF3-Alpha data over Alaska and so there is no existing data to form the foundation of the hydrologic network. Additionally, the primary mapping series in Alaska is the 1:63,360-scale product, and this is the scale that will be used to represent the NHD using 133 sub-basins. Alaska does have a significant advantage over the rest of the country however, because it has complete revised DLG-3, or CFF coverage over the entire State in the primary series. It should be noted that three additional sub-basins covering some Pacific islands will not be produced due to a lack of primary mapping. The production of the NHD is a five-step process: 1) The DLG and CFF quads for each sub-basin are paneled together and centerlines created by Titan Systems Corp.; 2) data from step 1 is used to create RF3-Alpha "1-D" (networked linear) sub-basin data by Horizon Systems Corp. and Titan Systems; 3) in parallel with step 2, data from step 1 is used to create feature-based "0-D" (point) and "2-D" (polygon) quadrangle data by Titan Systems; 4) the data from steps 2 and 3 are then loaded and combined in the FOD to create the NHD using the native FCP format by the USGS; and finally 5) the NHD data that was created in the FOD in step 4 is checked for network flow validation and quality assurance by Titan Systems. The NHD will ultimately be available to the user in the NHD-in-Arc data structure. Of the 133 sub-basins to be produced, 105 sub-basins have been produced to date by step 1; 56 sub-basins by step 2, 68 sub-basins by step 3, and 22 sub-basins by step 4. The goal is for all step 1 work to be done by May, all step 2 and 3 work to be done by July, all step 4 work to be done by August, and all step 5 work to be done by September. Most of Southeast Alaska will be produced last to allow time to incorporate data from the Tongass NF.

Michigan: Along with a dozen or so other states, Michigan has been a long-time advocate of the National Hydrography Dataset and has taken early action to explore and develop an NHD program. One such effort is a partnership between the Michigan Department of Natural Resources and the U. S. Forest Service to produce high-resolution NHD for sub-basins intersecting four National Forests in the state: Ottawa, Hiawatha, Huron, and Manis. As with the rest of the Nation, the impact of this joint venture is much larger than the Forests themselves, and in Michigan this may involve one-third of the State, covering 23 sub-basins. The DNR's Institute for Fisheries Research at the University of Michigan will produce some of the NHD while the Forest Service produces the remainder through its contractor. Current USGS involvement includes the development of a capability to transform data produced by the State and the Forest Service into the NHD process. This may later include wetlands. The USGS is also providing training, technical assistance, quality assurance, and database support. The Michigan data comes from the Michigan Information Center's Michigan Geographic Framework in which integrated layers such as hydrography and transportation data are revised using DOQ's. The Michigan Department

of Environmental Quality is also a key stakeholder in the NHD program. It is hoped that success in this initial effort will lead to eventual statewide coverage of high-resolution NHD through a partnership with the USGS. Both Michigan and the USGS have a keen interest in object oriented hydrographic models and both organizations are looking closely at the Environmental Systems Research Institute's GeoDatabase model. Federal interest in Michigan NHD also got an early start through the Department of the Interior's High Priority Base Mapping Program, which should see the production of the Manistique sub-basin completed shortly. Local governments also have an interest in NHD with one Michigan county beginning work on "local resolution" NHD. More information on NHD in Michigan can be obtained from Charley Hickman at: [chickman@usgs.gov](mailto:chickman@usgs.gov), or from the State at: <http://www.state.mi.us/dmb/mic/gis/nhd.htm>.

The FOD: The FOD (Feature Operational Database) has become an important issue in the NHD program recently due to problems getting completed sub-basins into the FOD. The entire high resolution NHD program remains under development and as long as people are producing NHD, there will always be new problems to solve and software to tweak. One of the final tests of whether all the NHD steps have performed adequately is when the data is loaded into the FOD. When data is slow to make it into the FOD, it may appear that the FOD is a bottleneck, but really the FOD is simply the point at which we are finally finding earlier problems. Here is a brief overview of what is meant by FOD loading: The FOD is the official repository for the NHD and is uniquely capable of implementing important characteristics of the NHD. The FOD uses the FCP (Feature Communication Protocol) data structure to handle "features" of data and their relationships rather than graphic elements, and also allows transactional updates important to NHD maintenance rather than swaps of entire sub-basins. The NHD produced by NHD-Create is in the ArcInfo data structure and must be converted to FCP to be loaded into the FOD. About one in five sub-basins are failing this process. Of these errors, a third are being fixed on the spot, a third require more elaborate research to fix, and a third are being returned to the producer for correction. Then, when "good" FCP data is loaded into the FOD, about one in five sub-basins are failing the FOD load largely due to standards problems. When the NHD is produced by FTI (Framework Tools Interface) rather than NHD-Create, about one in ten sub-basins fail the FOD load. In each case, almost all of the errors are fixed on the spot. The NHD is distributed to users in the NHD-in-Arc data structure with a program that converts it from the FOD's FCP structure. About one in five sub-basins are failing this process. These errors are fixed on the spot or by more elaborate research. The production process also requires a FCP file from the FOD that is input into FTI for flow validation and inter-CU connections. Virtually all sub-basins require some flow validation correction and this is considered a normal part of the process. Corrections, done on the FTI system, are usually easily made. In all errors, feedback to the NHD-Create and FTI processes will help mitigate future errors. Thus the error problems are a functionality of the maturity of the production process and software. As time goes on, and lessons learned, the success rate will improve accordingly. Also, the reliability of the FOD to remain on-line is an on-going problem. One or two months ago this caused considerable difficulty. The overall FOD loading process is currently a stumbling block because it takes time to find and fix the problems the FOD load has detected. This will improve with time as fewer errors are produced earlier in the process.

---

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Thanks to Ellen Finelli, Hank Nelson, and Charley Hickman.

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