

Development of a 4.8K Scale (Local Resolution) NHD Dataset for West Virginia

West Virginia GIS Technical Center
Natural Resource Analysis Center
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I. GOALS

The goal of this project is to develop local resolution (1:4,800 scale) NHD for West Virginia. Local resolution NHD would ultimately map every surface water feature in the state at a high level of detail, while also providing a framework for many water resource applications.

i. LOCAL RESOLUTION NHD

The National Hydrography Dataset (NHD) is a comprehensive digital spatial dataset, designed and distributed by USGS, that maps and describes the nation's surface water features, including streams, rivers, lakes, swamps, and constructed waterways. The NHD is currently complete at two different spatial scales for West Virginia: Medium resolution (1:100,000 scale) and High resolution (1:24,000 scale, to correspond with USGS topographic maps). Local resolution NHD refers to larger scale datasets that may be developed in the future following the NHD data framework to provide even greater levels of detail.

ii. FINAL PRODUCTS

The final products from this project will include the newly created local resolution NHD, data standards for local NHD, and a framework for data stewardship. NHD data at any scale support a variety of applications. The common format of the NHD at various spatial scales is designed to encourage cooperation and exchange of data between users at the federal, state, and local levels.

iii. BENEFITS

The local NHD in West Virginia will provide a highly detailed cartographic base map of rivers, streams, lakes and ponds that will correspond with the Statewide Addressing and Mapping Board (SAMB) photography and street maps at the 1:4.8K scale. This will be invaluable in efforts requiring detailed water feature maps, such as emergency and floodplain management, water quality permitting, and many other projects at the local or municipality level.

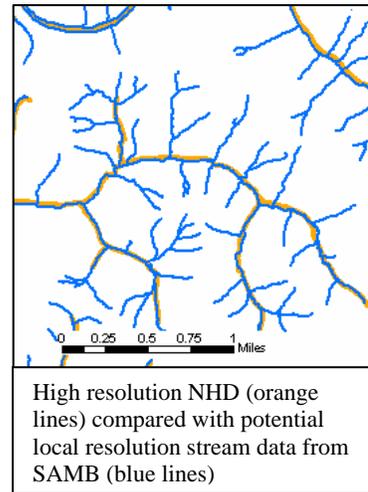
In addition to the use of local NHD as an important cartographic base layer, NHD forms a framework for modeling flow of water and pollutants throughout the stream network. Methods are currently under development in other regions to model perennial and intermittent flow regimes using NHD. The NHD can also provide a mechanism for mapping and modeling point locations along streams (such as discharges or water intakes) and properties of stream segments.

The local NHD in West Virginia may provide additional detail on changes to stream drainage due to activities such as mining or construction that has not been previously captured. According to EPA estimates, up to 1,208 miles of streams (over 2% of all stream miles) in the multi-state mountaintop removal/valley fill study region (including large portions of southern West Virginia) have been lost or directly impacted by filling and mining activities. These stream alterations are not mapped in the current NHD for West Virginia (medium/high resolution) but would potentially be identified and more accurately mapped by the local NHD.

Finally, the development of the local NHD for West Virginia is particularly important following the passage of the WV Water Resources Protection Act (SB-163) by the WV Legislature in 2004. This Act effectively claims the waters of the state as public natural resources for all citizens. The Act requires that the state quantify the "nature and extent" of its water resources as an aid in monitoring water usage and consumption. State agencies and institutions are also urged by the Act to provide relevant water resources information, and the development of the local NHD will directly further this effort.

II. DATA

The primary source of stream geometry for the local NHD will be hydrologic features mapped using stereo pair orthophotos by the SAMB project contractors. SAMB contractors mapped all streams



with visible water as either single-lined or double-lined streams with banks, depending on width. Visible lakes and ponds meeting minimum size requirements were also mapped, as were swamps and marshes. Intermittent stream features were not mapped, and hydrographic features were not named.

III. PARTNERSHIPS

The WVGISTC has assembled a list of likely partners and included these stakeholders in initial feasibility assessments. These include, but are not limited to: The Natural Resource Analysis Center, Canaan Valley Institute, WVDEP, WVDNR, USDA Forest Service, EPA, and FEMA.

i. FUNDING

Funding for the pilot project will come from the office of the West Virginia State GIS Coordinator. Future funding will most likely originate from a combination of federal grants and partnerships.

IV. METHODOLOGY

Creating local resolution NHD for WV will be carried out on individual river sub-basins. Pilot projects will be undertaken in two smaller sub-basins in order to help assemble working methods. A key first step will be to document WV local resolution NHD project standards and methodology. Next, the SAMB hydrography feature maps will be prepared and updated for use as a source map of surface water features for the local resolution NHD. Additional surface water features not captured by SAMB mapping will also be identified and added to the source map.

USGS conflation and quality control routines will be used in order to actually create the local resolution NHD from source data. The conflation process transfers required information (such as stream coding and flow) from the high resolution NHD to the newly created local dataset. USGS has agreed to serve as a technical resource and will provide software, documentation and training.

i. TECHNICAL ISSUES

Initial explorations of the data have revealed several minor issues that will require unique workarounds on the part of the producing agencies. First, the SAMB hydrography feature maps that are to be used as the base maps are incomplete and missing key surface water features in many areas. A systematic examination of several quadrangles in the Elk River drainage has resulted in estimates of missing features as high as 30%, indicating the need for careful editing and additions to the SAMB data before the process of NHD conflation is begun. Second, the high resolution NHD requires significant updates and edits before it may be used in the conflation process in order to avoid compounding errors and inconsistencies across datasets.

ii. TIMELINE

Initial estimates compiled by NRAC indicate that each sub-basin will require roughly 3 months to complete the local NHD creation process. West Virginia contains 12 complete USGS sub-basins as well as 21 partial sub-basins. At most, the project would take approximately 2 ½ to 3 years, but with more resources allocated, the time could be greatly reduced.

V. FUTURE CONSIDERATIONS

i. DATA STEWARDSHIP

No statewide mechanism is currently in place to ensure the long term maintenance, updating, and stewardship of the NHD within West Virginia at any spatial scale. A detailed long-term plan for the maintenance of these datasets is an absolute must for this project's overall success and usefulness. This will most likely take the form of a central agency or person responsible for compiling proposed updates and entering changes. This entity will act as a liaison to the USGS.

ii. CARTOGRAPHIC GENERALIZATION

1:4.8K NHD data will be far too detailed for effective utilization in the production of most cartographic products. The WVGISTC and interested partners will research various methods of generalizing new as well as existing data in order to create a cartographically pleasing product.

iii. ADJOINING STATES

In conjunction with USGS, West Virginia will need to make sure that the NHD product can be easily edge matched with adjoining states, should those states choose to update their own products in the future. Some framework exists for these efforts and WVGISTC will work closely with the USGS to facilitate future updates with adjacent states.