Thursday, May 1

Session M6: Geospatial Tools for Data Integration

3:30 – 5:00 pm | Room 232

The National Hydrography Dataset: A Geospatial Tool for Data Integration

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Abstract
The National Hydrography Dataset (NHD) is a geospatial infrastructure for surface water adopted by many state and federal agencies dealing with water monitoring in the United States. The NHD is a comprehensive set of digital spatial data that represents the surface water using common features such as lakes, ponds, streams, rivers, canals, and ditches. It consists of 7.5-million miles of flow network and 6.5-million lakes. A companion dataset, the Watershed Boundary Dataset (WBD) defines a hierarchical set of drainage areas of the United States ranging from major river systems down to local streams. In analysis, the NHD and WBD are used by scientists study surface water using geographic information system technology. Scientists and resource managers can take advantage of a rich set of embedded attributes that can be processed to generate specialized information. Many of these analyses are possible because the NHD contains a flow direction network that traces the water downstream or upstream. The NHD also uses an addressing system to integrate specific information about the water such as water discharge, water quality, and fish population. Using the basic water features, flow network, linked information, and other characteristics, it is possible to study cause and effect relationships, such as how a source of poor water quality upstream might affect a fish population downstream. A key characteristic on the NHD is the ability to link all types of water quality monitoring data in a common geospatial infrastructure. Virtually all water data has a geographic component and can be mapped. Mapping this data to the NHD allows for the integration of all water data by the common element of geography, or more specifically by surface water geography. This makes the NHD/WBD an excellent integration platform.

Innovative Applications of the New National Hydrography Dataset Plus (NHDPlus Version 2) – A National Surfacewater Geofabric

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Abstract
The National Hydrography Dataset Plus is a suite of geospatial products that build upon and extend the capabilities of the NHD by integrating it with the National Elevation Dataset and the Watershed Boundary Dataset. Interest in estimating stream flow volume and velocity to support pollutant fate-and-transport modeling was the driver behind the joint U.S. Environmental Protection Agency and U.S. Geological Survey effort to develop NHDPlus. Conceptually, NHDPlus is a national surface water 'geofabric' that uses the NHD stream network to weave together the local drainage areas (catchments) for individual stream segments. This comprehensive connectivity enables users to associate any location on the landscape with the stream it flows into and any location downstream (or upstream). NHDPlus also includes a diverse set of stream attributes, such as stream order, and catchment attributes, such as temperature, precipitation and land cover. The availability of this geofabric has also spurred users to develop their own catchment attributes that can be shared with the larger water resources community. NHDPlus has been used in a wide variety of applications since its initial release in the fall of 2006.

This widespread positive response prompted the multi-agency NHDPlus team to develop an enhanced NHDPlus Version 2 that was completed in October 2012, culminating a 2-year national production effort that incorporated many improvements identified by users of NHDPlus Version 1. The latest NHD stream network and WBD hydrologic boundaries were integrated with a much-improved National Elevation Dataset to produce a more-

capable NHDPlus that is supporting a new generation of applications. In addition, a more robust stream flow estimation process was applied to model improved mean annual and mean monthly flows for un-gaged streams. Learn about NHDPlus Version 2 concepts, improvements and selected applications, including sample and analysis frameworks for the EPA National Rivers and Streams Assessment and the National Lakes Assessment, georeferencing State water quality assessments and impairments to NHDPlus catchments, Healthy Watershed Initiative state pilot projects, and recent USGS regional SPARROW water quality modeling activities.

Georeferencing Water Quality Assessments to NHDPlus Catchments – A New Approach to Evaluating and Measuring Progress in Surface Water Quality

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Abstract

The US EPA collects water quality assessment decisions and the associated geospatial information from states and compiles the data into a national database, the Assessment Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS), and the associated geospatial repository. States submit geospatial data using various resolutions and reference hydrography layers. Traditionally, EPA has manually converted the state geospatial files to a single reference layer, the medium resolution (1:100,000 scale) National Hydrography Dataset Plus (NHDPlus), which is a costly and time consuming process.

EPA explored alternatives for compiling and georeferencing water quality assessment data as part of an Integrated Reporting (IR) Georeferencing Pilot. After exploring several options, the pilot focused on georeferencing state data files to NHDPlus catchments using automated methods. Rather than migrating the state data to a specific scale of hydrography, the state can maintain their original resolutions while EPA applies the catchments as an overlay framework to state data. This new approach allows EPA to apply a consistent structure for analyses, including evaluating and measuring progress in improving surface water quality.

Re-envisioning the National Hydrography Dataset

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Abstract

The National Hydrography Dataset (NHD) has been a critical tool for integrating hydrologic information for two decades. Dozens of agencies have indexed millions of discharge, water quality, and biological observations to the NHD. However, over those decades technologies have changed, analysis techniques have changed, and most importantly the problems being addressed by water scientists and resource managers have changed. The US Geological Survey National Geospatial Program is in the midst of redesigning the NHD to better meet your needs in the future. Central to this redesign is shifting the NHD from a mapping and inventory tool to a data analysis tool, incorporating or building linkages to other relevant datasets such as land cover; the National Wetland Inventory; meteorological and climate data; and other datasets. We welcome your input and suggestions.