

Hydrography Goals

Fiscal Year 2015-2016-2017

Future Vision

To drive new discoveries in the science and management of the Nation's surface water resources by providing a robust geospatial data framework. The U.S. Geological Survey's National Geospatial Program will accomplish this by providing effective solutions with the National Hydrography Dataset (NHD) and Watershed Boundary Dataset (WBD). It will also create an NHD and WBD well-integrated with high resolution elevation data. The NHD, WBD, and 3D Elevation Program (3DEP) will provide a geospatial framework for a National water information system that will provide interoperable water data and information through easily accessible outlets. The NHD and WBD will maintain current information through a mix of internal USGS expertise and external partner stewardship. The NHD and WBD will provide a strong underlying structure, rich attribution, linkage of scientific information, comprehensive flow modeling, and support for scientific investigation.

Strategy and Approach

The NHD and WBD are enabled by a comprehensive collection of surface water features, a strong data structure, a flow navigation system, linking of scientific information, and a continuous maintenance process through stewardship. NGP's approach is to continuously acquire new and improved data with finer resolution, and improve that data's integrity as part of an overall geospatial framework. It will effectively deliver the NHD and WBD using dataset downloads, web map and feature services, and ready-to-use map viewers. The program will build an integrated system of topographic data where the NHD, WBD, and 3DEP can work in an interoperable environment programmatically, spatially, and in the data structure. The NGP will enrich the information provided in these data by linking value-added data events, and will continue to work within the water community to achieve increased integration of NHD with other datasets. It will keep pace with developments in geospatial technology by creating modern data models that maximize the power of GIS. The high resolution NHDPlus will be developed to meet the advancing needs of water science and management.

Objectives for the future are organized into seven tracks:

1. Acquisition – To acquire new and improved hydrography data through stewardship
2. Data Improvements – To provide accurate NHD/WBD data
3. Delivery – To effectively deliver hydrography data and information to customers
4. Linking Data – To link information about water to hydrography data
5. Hydrography Model - Creating modern data models that maximize the power of GIS
6. NHDPlus - To produce GIS-ready data for the analysis of water on the landscape
7. Ele-Hydro – To build an integrated elevation-hydrography program, data, and services

Acquisition

To acquire new and improved hydrography data through stewardship

Fiscal Year 2015, 2016, 2017

The NHD program is rooted in collaboration and the stewardship process by which users help provide data is a fundamental strategy. The USGS is the lead agency for hydrography in the U.S. and has an obligation to ensure stewardship is successful. Stewardship will be the primary, although not only, process to acquire new and maintained data, including local resolution data. Some data may be collected in-house. Close coordination with our partners is an essential component of the equation. This includes advocacy, documentation, training, guidance, assistance, quality assurance, feedback, and communication.

Specific Tasks Planned:

- QA and process updates to acquired stewardship data for NHD and WBD
- Process NHD and WBD data received from international stewardship
- Maintain NHD and WBD Desktop Update Tools
- Provide Update Tool User Support
- Provide Conflation Tool User Support
- Maintain NHD/WBD and Stewardship websites
- Improve NHD/WBD Checkout Process
- Provide Hydrographic Data Community Support
- Update, maintain, and optimize conflation tools
- Conduct Conflation Research
- Develop and maintain NHD and WBD Web Update Tools
- Improve NHD/WBD Stewardship Process - Stewardship Reinvention Team
- Maintain Stewardship Web site to support tool checkout

Data Improvements

To provide accurate NHD/WBD data

Fiscal Year 2015, 2016, 2017

The NHD and WBD are complicated datasets. They need to be in order to provide such powerful capabilities. These complicated characteristics need to be enforced and maintained in order for the data to work. Things like the network, topology, names, linear referencing, change management, attribution, and metadata all need constant attention. The investment is big, but the payoff is even bigger.

Specific Tasks Planned:

- Inspect the NHD and WBD to detect and correct name errors
- Revise NHD and WBD data in Alaska to 1:24K standards
- Provide NHD editing service
- Conduct national quality campaigns for NHD and WBD
- Synchronize NHD and NHDPlus Edits
- Research and implement methods to improve error reporting
- Provide Data Processing Integrity
- Provide File Geodatabase for editing NHD/WBD
- Maintain NHD Utilities
- Update Coastline working with NOAA CUSP
- Update Glaciers with Ranolf Glacier Index
- Implement Markup Tool capability
- Maintain desktop metadata tool
- Navigation Table Development for WBD

Delivery

To effectively deliver hydrography data and information to customers

Fiscal Year 2015, 2016, 2017

Data delivery is the most critical capability of the hydrography program for unless the data can effectively get into the hands of the broad range of customers, there is no point in everything else that we do. Data delivery in the GIS world is becoming more sophisticated, demanding services in addition to traditional dataset downloads. The delivery strategy must address all skill levels and meet the needs of science and mapping. Data delivery must be fast, efficient, and be usable in the systems used by users. Communication is essential to effectively serving customers. The NHD web site and its content is a primary means of communication with the customer. This includes the development of tutorials and documentation. New integrated hydrography and elevation data made possible by LiDAR and IfSAR sources will have advanced enough at this point to require data delivery techniques.

Specific Tasks Planned:

- Deliver NHD, WBD, NHDPlus, NHDlite as datasets
- Provide data to the NRCS Data Gateway
- Deliver the NHD Lite via feature services
- Research/design/prototype web feature service for NHD/WBD
- Maintain WMS for NHD/WBD
- Serve NWIS Boundaries as web services
- Implement NHDlite generation capability
- Perform generalization on NHD data 1:24K USTopo requirements
- Develop and maintain hydrologic generalization tools
- Provide hydrologic generalization capability
- Develop NHD/NHDPlus web services for data and analytical functions
- Conduct NHD/WBD Advisory Team
- Provide a roundtable forum for maintenance practices for NHD and WBD
- Develop outreach/educational materials
- Upgrade the NHD website
- Provide Data and Performance Metrics
- Study generalization strategy - Generalization Strategy Team

Linking Data

To link information about water to hydrography data

Fiscal Year 2015, 2016, 2017

The NHD can be most successful if relevant water information is a part of the dataset. These data fall into two primary categories: features that are a part of The National Map feature catalog, and features that are not a part of that catalog. Features that belong to the former include, dams, streamgages, water quality stations, water diversions and HUC8 outlets. Features that belong to the later include National Wild and Scenic Rivers, permitted discharges, impaired waters, fish habitat, riparian classifications, water rights, inflow stream regulations, and others. An objective of the later category is to reference these to The National Map via an "Event Clearinghouse" that identifies access to the data, but does not necessarily store the data directly in The National Map.

Specific Tasks Planned:

- Maintain streamgages, quality stations, dams, diversions, outlets
- Provide Event Clearinghouse Support
- Maintain Hydrography Event Management (HEM) desktop tools
- Develop and Maintain HEM Web tools
- Provide HEM Tool Support
- Research methods to synchronize events across NHD databases - conflate events
- Load Wild and Scenic Rivers into Event Clearinghouse

Hydrography Model

Creating modern data models that maximize the power of GIS

Fiscal Year 2015, 2016, 2017

The NHD and WBD have provided effective models for representing the NHD and WBD that has resulted in widespread use of these datasets. As technology advances, the data models also must keep pace. One area of advancement is the concept of data delivery through web services. Another is the concept of “open” data formats. Also, the NHDPlus will require data model practices. Regular feedback from users through the NHD Advisory Team, water user engagement team, Hydrography Requirements and Benefits Study, and Open Water Data Initiative provide requirements. The upcoming hydrography benefits study may also provide important information to guide data modeling for the future.

Specific Tasks Planned:

- NHD/WBD Data Model Reinvention Team
- NHD and WBD Standards Maintenance
- Research capabilities in support of Department's Open Water Data Initiative
- Research implementation of Hydro Requirements and Benefits Study
- Research role of catchments with WBD
- NHD Stream Classification Team
- Research techniques for the development of Z-Values for the NHD
- NHD Waterbody Volumes Development
- Research the incorporation of bathymetry in NHD

NHDPlus

To produce GIS-ready data for the analysis of water on the landscape

Fiscal Year 2015, 2016, 2017 (Conterminous U.S.), 2018, 2019 (Alaska)

The NHDPlus is an integrated landscape model for elevation and hydrography data that generates flow volume and velocity estimates for the flow network. It has a highly successful record of applications as produced in the medium resolution NHDPlus led by the USEPA and the USGS Water Mission. The objective is to extend the record of success by producing the high resolution NHDPlus and to collapse the NHDPlus to one dataset and eliminate duplication of effort. This will require a robust hydrologic generalization process.

Specific Tasks Planned:

- Produce Hi Res NHDPlus for 1/3 of the conterminous U.S. in each of FY15, 16, and 17
- Produce Hi Res NHDPlus for Alaska in FY18 and 19
- Develop the NHDPlus generation software to create the Hi Res NHDPlus
- Develop the knowledge and skills necessary to work with the NHDPlus
- Develop and maintain NHDPlus Tools
- Perform Quality Assurance Review of NHDPlus
- Refresh NHDPlus for select areas
- Adapt Upstream/Downstream Navigation Web Service based on VAA's

Ele-Hydro

To build an integrated elevation-hydrography program, data, and services

Fiscal year 2015, 2016, 2017

A core mission of the USGS National Geospatial Program is to provide topography data for the nation. The two primary components of topography are elevation and hydrography. These work hand-in-hand in nature and need to also work together in their geospatial representation. The objective is to ensure these two components are working in harmony and are integrated in The National Map. There are several forms of integration including spatial alignment, programmatic coordination, and dataset interoperability to provide cross reference characteristics. A good example of the interworking of elevation and hydrography is the WBD and NHDPlus catchments, which are really a cross between 3DEP and NHD. Moving forward three-fold strategy will take place:

1. NHDPlus in the near-term (next 3 years)
2. Derive hydro from Digital Terrain Models (DTM's) in the immediate outyears (2-5 years)
3. Acquire NHD/WBD from Lidar/Ifsar in the long term (5-10 years)

Specific Tasks Planned:

- Develop integrated and enhanced hydrography/elevation data model
- Develop Ele-Hydro Option 2a/b following NHDPlus principles
- Research Ele-Hydro Option 3/4/5 hydro extraction
- Research Ele-Hydro Option 6 hydro extraction using breaklines
- Research the use of GeoNet 3.0