

USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

Web Based NHD Training Now Being Offered by USGS by BJ Smith

Web based NHD Training is being conducted on the first and third Wednesdays of each month. The first Wednesday of the month is Part 1 and discusses NHD background, how to create an NHD User Account, and how to order NHD for editing from the Training or Production websites. All software required to run the NHD Update Toolbar is discussed, including ArcMap 10.1, Service Pack 1 for ArcMap 10.1, ESRI Mapping and Charting for 10.1, and Service Pack 1 for Mapping and Charting for 10.1. The importance of following the guidelines found in the NHD User Guide for loading all required software and the requirement to load the software in a specific order is highlighted. Loading the latest version of the NHD Update Toolbar and how to display the toolbar are discussed.

The difference between the Training/Development site and tool versus the Production site and tool are thoroughly discussed. All NHD users need to understand that data ordered from the Training/Development Website may only be edited using the Training version of the NHD Update Toolbar, while data ordered from the Production Website may only be edited using the Production version of the tool. Future versions of the NHD Update Toolbar will allow a user to simply select either the Training or Production version of the Tool without having to unload and load different versions.

Part 1 also includes discussion of some basic NHD concepts including, unique Permanent Identifiers (Perm IDs) for each feature in the NHD, how Reachcodes are used in the NHD and why each editor for any particular State or region should be using the same logic for Reachcodes, which are used to place events on NHDFlowline features. The importance of the Flow Network and how to use the flow network and ESRI's 'Network Utility Analyst' tool is a very useful function in evaluating your edits to the NHD.

Finally, an ArcMap session is opened, and the NHD Update Toolbar functionality is discussed and sample edits are performed. All questions concerning any of the above are answered. Attendees are asked to open an NHD Training Account, 'Check Out' an NHD Training dataset, and practice edits they may be using in their particular editing sessions.

Part 2 of the training is held on the third Wednesday of each month. Attendees typically have ordered an NHD dataset, and have completed some editing on Training data. Any questions concerning information discussed in Part 1 or any questions concerning editing of the NHD are answered, typically by giving control of the WebEx session to attendees, so all may see the issue being discussed. All editing questions are answered, and attendees are encouraged to continue practice editing of the NHD. Once potential NHD Editors have experience with the editing process, functionality and the NHD Update Toolbar, access is granted to allow 'Checking Out' and editing Production data.

If you have questions or interested in setting up a Web Ex NHD Training session for your agency, please contact your USGS NHD Point of Contact. See <http://nhd.usgs.gov/stewardship> for a map of regions.

NHD Region 1: Hank Nelson	hpnelson@usgs.gov	303-202-4448
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NHD Region 4: Dave Arnold	darnold@usgs.gov	573-308-3533

NHD Stewardship in Florida by Edwin Abbey

The Florida Department of Environmental Protection NHD Stewardship team has long been recognized as one of the most active in the nation. The stewardship team consists of five full time GIS professionals working collectively to update the 24K High Resolution National Hydrography. The Department dedicated these resources because the NHD is an essential information resource for the state's surface water modeling, mapping and water quality assessments. Using aerial imagery, elevation and other digital resources, the team reviews portions of the database and updates it based on the information resources we have available. Development, natural and manmade change has greatly altered the original documented hydrography of the state. Maintaining the database serves a multitude of users, whether it be for having accurate cartographic representation or having proper delineation and network connections for environmental analysis and decision making. Editing priority is based on state programs, but the team should have some flexibility to target areas requested by other NHD users. Additional emphasis is placed on updating names information. These updates typically fall in one of four categories in the following order of least to most work involved with making the change requested: (1) updating the NHD with an official name that is missing from the NHD, (2) correcting a typo in the official names database (3) submitting locally known names to the Board on Geographic Names that aren't officially recognized, and (4) submitting a new name as requested.

NHD Update Tool Status by Paul Kimsey

After final testing in May, it was determined that NHD Update tool v6.1.0 for ArcGIS 10.1 has one remaining issue deemed major enough to resolve and subsequently produce a new build for testing. A dedicated software testing team will perform A-Z component testing before delivering the new build for user acceptance testing. The tool will be released as soon as possible.

Development of NHD Update tool v6.2.0 for ArcGIS 10.2.x began on May 22nd and ended on June 10th. This development produced an internal only delivery for testing. The main focus items, (1) migrating to ArcGIS 10.2.x, (2) use of file geodatabase checkouts, and (3) introducing "Provisional Names" functionality were all successfully achieved. The next NHD Update tool development sprint for v6.2.0 is scheduled for July and will have a four week duration. The goal will be to implement the Provisional Names functionality which will allow NHD editors to add new GNIS (GAZ) names while editing the NHD spatial data.

Network Improvement Project Status by David Kraemer

The Initial phase of the Network Improvement project has three remaining sub-basins in the conterminous United States. Network Improvement will edit 08030202 and 08030207 once the state of Mississippi checks in these sub-basins. Sub-basin 04080300 has Stewardship extraction issues. Region 19 is in work as part of preparing the Alaska Hydro Image Integration projects.

The Double Check phase is correcting any additional errors that would prevent the creation of the NHDPlus VAA. Currently in work for the Double Check edits are Regions: 01, 05, 09, 12, 13, and 18. Region 06 has been run through NHDPlus QA/QC checks a third phase and is waiting for 06010105 to check-in to do additional edits before creating NHDPlus VAA.

The additional rounds of running NHDPlus QA/QC checks and making Network Improvement edits is necessary due to network errors introduced into the NHD geodatabase by NHD edits done in the time between Network Improvement completion and the creation of NHDPlus VAA. The pre-staged NHD file geodatabase Sub-Regions are available with mid-May, 2014 dates. So any Network Improvement edits to the NHD geodatabase after those dates are only available through custom extracts.

Initial Network Improvement Regions Completed: 01, 02, 03, 06, 07, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, and 22.

Double Check Network Improvement Regions Completed: 02, 06, 07, and 20.

New Hydrography Staff

Cynthia Deischer: Cynthia was born and raised in Aurora, Colorado joining the USGS in 2010 after graduating from University of Colorado at Denver in 2009 with BA in Geography and a GIS certificate. Having commuted across town for two years, she has now moved to closer to the Denver Federal Center in South Denver near Ruby Hill Park. She keeps busy after work doing home renovations, quilting, visiting friends and family, helping others, camping, hiking, and hanging out/traveling with her boyfriend Mat and their two dogs. Working on several minor projects at the USGS has given her the opportunity to work with various co-workers, take leadership training, work on NHD Gazetteer (GAZ) Updates tool, create and manage grids used on the US Topo as well as helping create and training co-workers how to use the internal NGTOC Google Site. After working on the US Topo project for four years, she is excited to join the NHD team!

Tom Hale: Tom has worked for the USGS mapping discipline for thirty years. He has taken part in the evolution of mapping from using analog methods to today's digital methods. He has participated in production mapping and geographic research for agencies such as the Mid-Continent Mapping Center, Mid-Continent Geographic Science Center, Eros Data Center, as well as the National Geospatial Technical Operations Center. With Tom's background and experience, the NHD team is very excited to welcome him to the exciting and sometimes challenging world of NHD.

Caitlin Reusch: Caitlin is a recent graduate of the University of Colorado Denver. She majored in Geography with certificates in Geographic Information Systems and Urban Agriculture. Caitlin is delighted to be joining the NHD and furthering the efforts laid out in the mission to ensure that the nation has accurate hydrologic data. In her spare time, she enjoys gardening, outdoor activities such as hiking, and making stained glass items. Caitlin also volunteers as the foster coordinator for Colorado Aussie Rescue, which specializes in herding and cattle dog breeds. She looks forward to working with everyone!

Selecting Only Major Rivers in the NHD using ArcMap

The NHD contains a lot of information, but for some applications, particularly those at small scales, it needs to be generalized. One approach is to show only "major rivers" in the NHD. A quick technique to show only the named rivers can easily be done by selecting NHDFlowline GNIS_NAME > '0'. See: ftp://nhdftp.usgs.gov/Hydro/Images/BlueRiver_Named_Rivers.jpg To be even more restrictive, major rivers can be defined as only "double-line" or polygonal rivers, which appear in NHDArea. This is more complicated, and takes a few minutes, but works well. This approach finds the Artificial Path of those polygonal rivers:

1. Find the polygonal rivers: Select by Attributes NHDArea where FType = 460 - Stream/River.
2. Now it is necessary to find the NHDFlowline Artificial Paths of those rivers. Artificial Paths are linked to the polygon they are inside of using the field WBArea_Permanent_Identifier. Create the link by doing a relate between NHDFlowline (key WBArea_Permanent_Identifier) and NHDArea (key Permanent_Identifier).
3. Invoke the relationship and select the corresponding NHDFlowlines.
4. For clarity, turn off the NHDArea selected features (the polygonal rivers).
5. Now the candidate artificial paths are selected, but there are two problems: One is that the rivers running through lakes are not selected (which they should be), and two, the "stubs" of the tributary artificial paths have been selected (which are not wanted).

6. Next order of business is to eliminate the minor stubs with no name. Select from selection by Attributes NHDFlowline GNIS_Name > '0'. Now only stubs that are named remain.
7. Some of the remaining candidate artificial paths are wanted (the major rivers) and some are not (the named stubs). The named stubs can be eliminated by virtue of the fact that there are very few of them (normally one record per name) and those with low counts can be eliminated.
8. Open the NHDFlowline attribute table. Some records are selected (the remaining candidate list) and some are not (all other flowlines making up "minor rivers"). Summarize the number of records under the field GNIS_Name and write this out as Sum_Output.dbf which you then add to ArcMap.
9. Now the goal is to find the names of the major rivers. These will be rivers with a record count greater than 1. The extraneous non-named stubs have already been eliminated, which helps reduce the load. The next steps will select only records with significant counts, that is, the major rivers. This will allow deselecting the remaining NHDFlowlines and in the process eliminate the named stubs.
10. It is necessary to relate Sum_Output (key GNIS_Name) with NHDFlowline (key GNIS_Name) to make it possible to use the GNIS_NAME's to select the major rivers in NHDFlowline.
11. Open the Sum_Output table. Note the field Count_GNIS_Name which will be used to count records. This will eliminate named stubs, leaving just the major rivers selected. Create a New Selection, Cnt_GNIS_N > 1. Leave the table open. Note major rivers are selected.
12. Invoke the relationship to select the major rivers. In ArcMap all "major rivers" have been selected, even rivers through lakes. See ftp://nhdftp.usgs.gov/Hydro_Images/Blue_River_Selected.jpg

Esri International User's Conference Sessions on Water

TUESDAY, July 15

- 8:30-9:45 28E

Stewardship and Development of National Datasets

The session presents stewardship and development topics related to national datasets including NHD and WBD.

The National Hydrography Dataset in the Pacific Region: Carol Ostergren/Drew Decker - USGS

The National Watershed Boundary Dataset (WBD) Evolution 2009-2014: Karen Hanson - USGS

The Integration of Elevation and Hydrography Data: Jeff Simley - USGS

- 9:30-10:00 Exhibit Hall B-Analysis and Geoprocessing

Hydrologic and Hydraulic Modeling for Floodplain Delineation: Dean Djokic - Esri

- 10:30 – 12:00 28E

Developing and Using NHD and NHDPlus

This session presents topics related to development and utilization of NHD and NHDPlus data.

Improving Oregon's Water Distribution Reporting System: Robert Harmon - Oregon Water Resources

From LiDAR terrain to NHD Local Resolution, Urban and Rural Workflows: Brian Quinn - City and County of San Francisco, Enterprise GIS

Representing different hydrologic conditions in hydrographic networks: Alan Rea - USGS

Building Analytical Applications Using NHDPlusV2: L. McKay - Horizon Systems Corporation, Tommy Dewald - U.S. Environmental Protection Agency, Alan Rea - USGS

- 10:30-11:00 Exhibit Hall B-Environment Showcase

One-Click Watersheds Using ArcGIS for Desktop and ArcGIS Online: Caitlin Scopel - Esri

- 11:00 – 11:30 Exhibit Hall A-General Theater 1

Creating Watersheds and Stream Networks: Steve Kopp – Esri

- 12:00 – 12:30 Exhibit Hall A-General Theater 1

Creating a Hydrologically Conditioned DEM: Dean Djokic - Esri

- 12:00 – 1:00 23B

NHD Special Interest Group

- 1:30-2:45 30E

GIS for Flood Modeling and Response

This session will explore how GIS is used in flood modeling and response.

Flood Hazard Classification Modeling: Shane Willard/Jackie Contreras - Bureau of Indian Affairs

Flood Assessor App – Making Flood Response Mobile for British Columbia: Joshua Chan - Ministry of Forests, Lands & Natural Resource Operations

Charting the Course of FEMA's Digital Flood Hazard Data: Scott McAfee - DHS/FEMA

- 1:30-2:45 28E

Water Resources Information Systems

This session presents comprehensive water resources information systems.

Discovery and Access to Global Water Data and Maps: David Maidment/David Arctur - University of Texas at Austin

Using GIS to create efficiencies in Statewide water quality policy: Danielle Bram - CSUN

Assessing water quality with maps, XML and duct tape: John Zastrow - Tetra Tech, Jeff Kapellas/Stephanie Bucknam - California State Water Resources Control Board

The Application of Water Resource Information System in Taiwan: Ming-Yuan Wang - Geographic Information System Research Center Feng Chia University

- 3:15-4:30 17A, Thursday 1:30-2:45 17B

Hydrologic and Hydraulic Modeling: Dean Djokic – Esri

- 3:15-4:30 15A, Wednesday 1:30-2:45 14A

Geometric Networks: An Introduction: Erik Hoel/Craig Gillgrass – Esri

- 3:15-4:30 28E

Water Resources Data Development Techniques

Definition and characterization of water features is the backbone of GIS applications in water resources. Techniques for wetland, river, and lake characterization are presented.

Uncertainty in Wetland Hydrologic Index of Prioritization: Fuzzy Sets: Martin Alcala Jr - City of Houston Public Works and Engineering

Documenting Changes in Lake Morphology of Six Inland Wisconsin Lakes: Christine Koeller - UWSP

Exploring an Automated Mapping Methodology for Coastal Runup Zones: Elena Drei-Hortan/Kristen MacDougall - AECOM

WEDNESDAY, July 16

- 8:30-9:45 28E

Storm Water Applications

Due to the detailed nature of storm water systems and their combined natural and man-made nature, they pose special requirements on GIS technology.

Drainage Area Delineation for Storm Water Drains from LiDAR Data: Chieko Plotts/Brandon Jones - HDR

Urban SubH20shed Initiative: Aaron Hebert/Ryan Pilewski - Franklin Soil and Water Conservation District

Using ArcGIS Server as a Storm Water Tracking Tool: Jim McPherson - RBF Consulting

Illinois' Statewide Streams Database: Andrew Hulin - IDNR

- 10:15-11:30

GIS for Stormwater

GIS plays a critical role in stormwater management and billing workflow.

Developing a Basin-wide Stormwater Management Plan - A Case Study: Rama Sivakumar - Georgia Institute of Technology

County of Los Angeles Storm Drain System: Marianne Jeffers - County of Los Angeles Department of Public Works, Jeff Wingate - County of Los Angeles

Stormwater Billing – The Impervious Area Connecting GIS and Finance: Shiju Mathew - Halifax Water
Mapping Impervious for Stormwater Utilities: Why and How: Carrie McCrea - AMEC

- 10:30-11:00 Exhibit Hall B-Environment Showcase

Using ArcGIS Online for Hydrologic Analysis: Daniel Siegel – Esri

- 12:00-1:00 31B

USGS All Hands Meeting

- 12:00-1:00 26A

Hydro Special Interest Group

- 1:30-2:45 28E

GIS for Support of Hydrologic and Hydraulic Modeling

Utilization of GIS to support hydrologic and hydraulic modeling is presented.

H&H Modeling – Using GIS to solve fluid problems: Sheng Tan/Kyle Morgan - Wood Rodgers, Inc.

A Hydro Data Model for Hydrologic Analysis within Engineering: Peter Wilson - Aurecon

Radar Precipitation Data Geospatial Tool for Urban Hydrology: Celso Ferreira/Sergio De Hoyos - George Mason University

- 1:30-2:45 14A

Geometric Networks: An Introduction

Erik Hoel – Esri, Craig Gillgrass - Esri

- 3:15-4:30 28E

Flood Modeling

This session presents approaches to peak flow and flood modeling.

Flow Exceedance Maps for Michigan based on Real Time & Historical Data: Chad Fizzell/Marlio Lesmez - MDEQ-WRD

Enhancing Regulatory Data to Generate Flood Forecast Inundation Maps: Ryan Meekma - Prairie Research Institute

Automated Flood Forecast System: Nahm Lee - SCVWD

- 3:15-4:30 23B

3D Mapping Big Data 3D Elevation with ArchGIS

This session will cover how US states are utilizing GIS to manage multiple year Lidar elevation

Introducing the Z-Management Toolbar: David Triggs - Minara Resources

Living LiDAR; data collection at QL2: Hope Morgan - NCEM

Working w/Big Data: Migrating 800M Data Points to ESRI's Terrain Dataset: Stephen Brown/John Peterson – U.S. Army Corps of Engineers Albuquerque

- 3:15-4:30 26A

Environmental Management: Water Quality

This session will explore diverse applications of GIS in assessment, monitoring and management of water quality in environmental management.

Solving NPDES Regulatory Requirements by Leveraging the AGO Platform: Timothy Abdella - JMT Technology Group, Morris Walton - Virginia Department of Transportation

Water Quality and GIS: Results of GIS supported programs in Virginia: James Martin - WorldView Solutions

Impact assessing of agri-environmental measures on groundwater quality: Alexandru Vasile - Freiburg University

- 4:30-5:00 Exhibit Hall B-Esri Labs

Flow Mapping of Major Rivers in the United States

Witold Fraczek - Esri

- 7:00-10:00PM

Team Water Special Interest Group Meeting

THURSDAY, July 17

- 8:30-9:45

3D Modeling for Lakes, Wetlands and Sea Level Rise Using ArcGIS

With new tools available in ArcGIS to create high resolution 3D elevation, environmental groups can now quickly model scenarios that help provide the best products for both inland and coastal conservation.

Error Reduction Techniques on a Salt Marsh DEM using RTK GPS: Adam McClure - San Francisco State University

Modifying LAS Dataset Processing for Enhanced Hydrologic Modeling: Bruce Millett/Janet Gritzner - South Dakota State University

Modeling Pathways of Phosphate Loading in the High Sierra Lakes: Micah Taylor - University of Redlands

- 10:15-11:30 28E

Water Quality Modeling Techniques

The water quality modeling session focuses on water quality characterization for source water protection, in water bodies, and agricultural land use.

A practical GIS model for regional and local water resource management: Feng Yu - Purdue University

Modeling fate and transport of contaminants in coastal watersheds: Bown Du/Chris Breed - Baylor University

A GIS tool to estimate E.coli loads from On-Site Sewage Facilities: Afreen Virani - Texas A&M

Applying GIS in Public Water System Source Protection in Oregon: Steven Aalbers - OR Dept. of Environmental Quality

- 12:00-1:00 28D

Water Resources Special Interest Group

- 1:30-2:45 17B

Hydrologic and Hydraulic Modeling: Dean Djokic – Esri

- 1:30-2:45 28E

Water Resources Modeling Systems

This session presents water resources data, modeling, and decision systems with distinct international flavor.

WaterToolbox Tool - integrating R code into ArcToolbox using Python: Weiping Zeng/Nicole Nadorozny - University of Saskatchewan

Stakeholder accessible water resources data and models: saurav kumar - Virginia Tech

Spring management in mountain areas by GIS: Gianpiero Amanzio/Marina De Maio/Muriel Lavy - Politecnico di Torino

Response of the Tugela River, to Climate and Anthropogenic Forcing: Simone Pretorius - University of Pretoria

- 1:30 28C

Python for Analysis

A flexible Python script tool for stratified random site selection: Curtis Price, USGS

The Network Value Added Attribute of the Month

Do you know your VAA's? This NHD Newsletter article is the fifth in a series to describe each of the Network Value Added Attributes. The flow network embedded in the NHD is what gives NHD its analytic power. The Network VAA's boost this power by pre-calculating a number of network characteristics to make network analysis richer and easier to exploit. This month will examine TerminalPathID.

All of the VAA's discussed thus far have dealt with hydrologic sequence number, HydroSeq, described in the February 2014 NHD Newsletter. Another HydroSeq attribute is TerminalPathID. This is simply the hydrologic sequence number of the network's terminal NHDFlowline feature. For example, if the NHDFlowline emptying into the Gulf of Mexico on the Mississippi River is "52", then the

TerminalPathID of all flowlines upstream with be “52”. This is a handy way of knowing the terminus of any flowline in the network.

NHD Photo of the Month

This month's photo was submitted by Jeff Simley from the USGS. This photo is of the Colorado River flowing through Little Gore Canyon near Radium, Colorado on June 1, 2014. The flow is 7,950 cubic feet per second. See ftp://nhdftp.usgs.gov/Hydro_Images/Little_Gore_17.JPG. Submit your photo for the NHD Photo of the Month by sending it to jdsimley@usgs.gov.

May Hydrography Quiz / New June Quiz

Wendy Steinberger Alaska Department of Natural Resources was the first to guess the May NHD Quiz as Albemarle Sound, on the Atlantic Ocean in North Carolina. It's also near the location of the Wright Brothers first flight at Kitty Hawk. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography106.jpg> Wendy works for the State of Alaska, Department of Natural Resources, Division of Mining, Land and Water, within the Public Access Assertion & Defense Unit, Navigability Subunit. The main component of her job is identifying those waters that the State of Alaska believes are navigable for title (public trust), and navigable or public under state law. One of the components of Wendy's position, with the help of an intern, is to maintain the navigable waters dataset. This dataset is an extract of the NHD with value added properties regarding navigability. She is also vice-Chairperson for Alaska Hydrography Technical Working Group.

Others with the correct answer (in order received) were: Linda Davis, Tom Denslinger, Jim Mitchell, Peter Cada, Jim Sherwood, Jonathan Labie, Jim Seay, Richard Patton, John Lynam, Dennis Dempsey, John Griffin, Kitty Kolb, Amy Prues, Rod Sheets, Matt Rehwald, John Kosovich, Stephanie Kula, David Straub, Michael Zapior, Dan Button, Lou Marion, Steve Aichele, Steve Shivers, Joanna Wood, Lorri Peltz-Lewis, Mike Butler, Roger Barlow, Ulf Gafvert, Ron Wencil, Ralph Campbell, Evan Hammer, Adam Dresser, Ellen Lesch, and David Asbury.

Last month we misidentified the others who guessed the April quiz. Beside winner David Hockman-Wert, they are: Dan Button, Barb Rosenbaum, Calvin Meyer, Al Rea, Ken Koch, Adam Oestreich, David Asbury, Ellen DAmico, Matt Rehwald, Lorri Peltz-Lewis, Richard Campbell, Glenn Guempel, Kelly Larvie, Tom Christy, Doug Rion, Laurie Morgan, Dennis Dempsey, and David Straub.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography107.jpg>. Where is this? The bright green areas are Reservoir type Evaporation Pond. Brown areas are Foreshore. Light blue areas are Sea/Ocean. Send your guess to jdsimley@usgs.gov.

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 BJ Smith, Edwin Abbey, Paul Kimsey, David Kraemer, Cynthia Deischer, Tom Hale, and Caitlin Reusch.

The NHD Newsletter is published monthly. Get on the mailing list by contacting jdsimley@usgs.gov. You can view past NHD Newsletters at http://nhd.usgs.gov/newsletter_list.html
Jeff Simley, USGS, assumes full responsibility for the content of this newsletter.