

USGS National Hydrography Dataset Newsletter
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by Jeff Simley, USGS

Thirteenth Year for NHD Newsletter

This edition of the NHD Newsletter marks the start of the thirteenth year for the newsletter. Every month for the past twelve years people involved in the NHD and WBD programs have received important information to keep them aware of what is going on at USGS and other agencies with the NHD and WBD. So far approximately 720 pages of information have been written about these programs. Newsletter readers are encouraged to send in articles on their work to help spread the word of how the NHD and WBD are contributing to water management and science. To view past newsletters go to http://nhd.usgs.gov/newsletter_list.html

One Hundredth Hydrography Quiz

This month's hydrography quiz marks the 100th edition of the quiz. Over 2,000 quiz responses have been sent in since the quiz started. Each quiz shows an important and unique characteristic of the Nation's surface water.

NHD Harmonization with Canada Completed by Pete Steeves

The last of the Canadian border units, Lake Superior, was officially checked back into the NHD this past week. This marks the culmination of a 4 year project to "harmonize" NHD data with sister Canadian NHN (National Hydrography Network) data to the North. Lake Superior was the 120th unit to be harmonized along the 5000 mile border (including the Alaska border with British Columbia and Yukon). The harmonization process included thousands of rivers, lakes and other hydrography features. Coordination will now enter a maintenance phase that is likely to include NHD Stewards. Special thanks to Tim Hines of the USGS National Geospatial Technical Operations Center for his hard work in making this project a success.

NHD/Image Integration – CONUS by Chris Lund

Fiscal Year 2014 begins the fifth year of the USTopo Program and National Geospatial Technical Operations Center image integration work building the hydrography layer for approximately 18,000 USTopo quadrangles per year. This year's program of work supports the second cycle of map production for: Ohio, New Mexico, Idaho, Washington, Utah, West Virginia, New Jersey (generalized to 1:24k from local resolution NHD), Georgia, North Dakota, Delaware, Maryland, Montana, Arkansas, South Carolina, Oregon, Michigan, and Maine.

The most recent NAIP imagery is being inspected and updates to the NHD are focused on areas of major change with specifications for minimums tightened slightly since the first cycle of map production. In addition, GAZ names are also being reviewed as part of the current workflow process. The workload is being coordinated with NHD Points of Contact who work with Data Stewards in regards to schedule, and provides opportunity for them to add their NHD updates so they get reflected on newly published USTopo maps. Future growth in support for the USTopo program will explore integration of NOAA coastline data.

Alaska Hydro Image Integration by Tony Litschewski

The USGS National Geospatial Technical Operations Center (NGTOC) began the Alaska hydro image integration project in FY 2013 as an extension of the CONUS image integration project. The goal of the project is to locate and resolve major errors in the Alaska NHD in preparation for production of the USGS's new series of digital topographic maps, the US Topo.

In FY 2013, there were 412 1:25,000 cells which had the NHD updated and were used in the US Topo. In FY 2014, the production goal is tentatively scheduled for updates to over 900 cells. A multi-year, statewide program will eventually result in updates to over 11,000 cells.

Due to the immense size and scale of this project, the intricacies between production workflows, and also the addition of updating glaciers and coastlines starting in FY14, the project was broken into 4 separate sub-projects: Pre-FY14, coastline updates, glacier updates, and image integration. Following is a brief description of each of these sub-projects.

Pre-FY14: There are several checks/fixes taking place during this sub-project. QC checks are run using the NHD GeoEdit tool and all valid errors will be resolved. Also, since large portions of Alaska had the WBD updated and reaches were not migrated at that time, this step looks for and fixes the necessary migrations. The final item being fixed is ocean names. Prior to this project, the rule of thumb was to use the name of the ocean. The ocean names are now being changed to the smaller feature names such as bays, seas, and sounds as delineated by the GNIS team at the NGTOC.

Coastline updates: Parts of the NHD coastline features in the existing 1:63,360-scale NHD are being updated with newer shoreline data from the National Oceanic and Atmospheric Administration's Continuously Updated Shoreline Product (NOAA CUSP). NOAA has performed the science, cartographic review, and validation to delineate mean-high water (MHW) shoreline for much of the conterminous U.S. and parts of Alaska. Ultimately, all NHD coastline reaches will be entirely replaced wherever NOAA CUSP data is available. The process requires the existing NHD coastline to be edge matched or blended to the new NOAA shoreline. In many cases, polygon streams in the NHD are Mean High Water features in the NOAA CUSP. In such cases, a cartographic decision must be made to balance the amount of time editing against the need for the NHD to be as accurate as possible. Finally, existing NHD flowlines must be reconnected to the new coastline to maintain the NHD flow network. Flowlines are only re-connected to the coastline if a channel is visible on 2011 SPOT color infrared imagery.

Glacier updates: The Randolph Glacier Inventory (RGI 3.2) is a global inventory of glacier outlines. It is supplemental to the Global Land Ice Measurements from Space initiative (GLIMS) <http://www.glims.org/RGI/>. This sub-project consists of replacing existing NHD IceMass features with RGI v 3.2 in areas where coverage exists. In many cases, the IceMass features have receded, resulting in the need to extend Stream/River features to the terminus of the glacier. In other instances, glacial lakes have grown in size and must be reshaped to ensure there are no gaps between Lake/Pond and IceMass features.

Image integration: The NHD is being reviewed against the most current SPOT imagery and updated using the following specifications:

- Realign polygon streams/rivers that are greater than 100' wide when the position of the banks have moved more than 750'
- Add new lake/ponds 400,000 sq. meters or larger
- Modify position of lake/ponds that are larger than 1.0 sq. km, that do not have an elevation value, if the shorelines are off more than 350'

- Add new area of complex channels if total width of area is greater than 100'. For the most part, existing areas of complex channels will remain unchanged since partners with local knowledge have provided this compilation.

Recognizing that updating the NHD for the entire state of Alaska might be a daunting task, the NGTOC began investigating ways to improve production efficiencies and take advantage of breakline data being delivered as part of the IfSAR data acquisition. Dr. Kristina Yamamoto and Tony Litschewski designed, developed, and implemented an ArcMap model which uses NHD and breakline data to automatically search for the first three update specifications listed above. Use of this model essentially fully automates the inspection process and allows an editor to drive to areas in the NHD identified as having changed. The new workflow and use of this model has proven to save a substantial amount of production time.

For coastline update information, please contact Michael Tinker, mdtinker@usgs.gov, 303-202-4476
 For glacier update information, please contact Kathy Yoder, kyoder@usgs.gov, 303-202-4419
 For general information, please contact Tony Litschewski, aalitschewski@usgs.gov, 303-202-4292

Network Improvement Project Status by David Kraemer

The Network Improvement project is focused on three main initiatives: (1) Edits in Alaska, (2) Uncompleted Regions outside Alaska on hold for State sub-basin check-outs and border harmonization, and (3) Double Checks for Completed Regions outside Alaska:

Alaska (Region 19): Network Improvement has started with Sub-Region 1903; the Kuskokwim River drainage and the Aleutian Islands. There are two team members editing individual sub-basins, ten are completed so far. During the initial run of the Value Added Attribute (VAA) software checks there were found in Alaska: 283 Loops, 308 Improper Network End or Start, 13,846 Flow Table & Flowline Direction Disagreements, 724 Nonlinear Flowline Reach Codes, 221 Nonlinear Names, 8 Duplicate Waterbody with same Reach Code, 1,345 Micro-Gaps, and 1,686 Duplicate Flowline. All of these VAA severe errors (tools severity 1) will be corrected, along with many of the tools severity 3 errors, as we edit the sub-basins.

Uncompleted Network Improvement Regions outside Alaska and Sub-Basins Checked-Out by the States:
 03 – Florida (03090101 & 03090205) and Alabama (03160205)
 05 – Indiana (05120111, 05120113, 05120201, 05120202, 05120206, 05140104)
 08 – Louisiana (08040207, 08040302, 08080101, 08080102, 08080202, 08080206, 08090203, 08090302) and Mississippi (08030202 & 08030207)

As the States check-in their jobs Network Improvement will finish the uncompleted Regions. The outstanding sub-basins of Regions 1 and 4 along the Canadian border will be completed after the Canadian border harmonization is finished and the Geodatabase extracts are for only US data. Previous Regions Completed: 02, 06, 07, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, and 22.

Network Improvement Double Check: To insure all VAA severe errors were corrected during Network Improvement, Regions 6, 20, and the southern part of 18 were run through the VAA software checks a second time. It has been discovered that there are two checks that are not being done by the GeoEdit tools; Check 19 (Nonlinear Flowline Reach Codes) and Check 27 (Duplicate Waterbody with same Reach Code). Regions 6 and 20 have been completed; southern Region 18 is in work by a team member. Additional Region rechecks will be done once computer software access issues are resolved. The two checks not currently being done by tools were submitted for adding to a future release of the tools.

Quantifying the Impact of the NHD to Research by Kristina Yamamoto

Thousands of peer-reviewed journal articles have been published that utilize the NHD in some way since its initial creation in 2001. Work has begun to analyze the influence of the NHD to the wide variety of fields it has affected. Not surprisingly, some of the main research themes are using the NHD for locational comparison to both streams located on the ground and those identified using modeling algorithms, as well as using the NHD's attribute information for stream classification. However, it appears the bulk of the research papers use the geographic information contained in the NHD for modeling efforts that include species habitat and the effects of urbanization and other land cover changes. From the preliminary research, it is clear that the NHD has had far-reaching effects that ripple into many disciplines, beyond those that are primarily hydrologically-based. Below is a list of the number of articles published that reference NHD and/or WBD and the name of the journal the article is published in:

49: JAWRA JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION
38: ENVIRONMENTAL MANAGEMENT
28: PROCEEDINGS OF THE WATER ENVIRONMENT FEDERATION
26: WATER RESOURCES RESEARCH
19: JOURNAL OF FISHERIES
18: JOURNAL OF HYDROLOGY
18: WETLANDS
12: JOURNAL OF HYDROLOGIC ENGINEERING
12: LANDSCAPE ECOLOGY
12: LANDSCAPE AND URBAN PLANNING
11: NORTH AMERICAN JOURNAL OF FISHERIES
9: PLOS ONE
8: FISHERIES
8: PHOTOGRAMMETRIC ENGINEERING AND REMOTE SENSING
8: ENVIRONMENTAL MODELLING & SOFTWARE
7: HYDROLOGY AND EARTH SYSTEM SCIENCES
5: LIMNOLOGY AND OCEANOGRAPHY
4: BIOLOGICAL INVASIONS
4: COMPUTERS, ENVIRONMENT AND URBAN SYSTEMS
4: GISCIENCE & REMOTE SENSING
3: FRONTIERS IN ECOLOGY AND THE ENVIRONMENT
2: ENVIRONMENTAL MODELING & ASSESSMENT
1: INTERNATIONAL JOURNAL OF REMOTE SENSING

Downloads of NHD Data from the USGS in October

The government shutdown in October also shut down the NHD web and ftp sites, drastically cutting down the number of NHD datasets that could be downloaded. During October there were 2,338 ftp downloads of NHD datasets, down from 5,438 in September. This is broken into 865 downloads of statewide high resolution NHD and 22 medium resolution downloads. This is down from 2,189 and 141 respectively in September. There were 1,314 subregion-based high resolution downloads and 75 medium resolution downloads for file based, compared to 2,164 and 374 respectively for September. There were 45 high resolution subbasin and 17 medium resolution subbasin downloads for personal geodatabase. This is compared to 405 and 165 for September.

During September there were 1,600 downloads from The National Map viewer, down from 2,757 in September. There were 1,180 rectangle extracts of various sizes and 420 by subbasin or county, down from 2,058 and 699 respectively in September.

2014 AWRA Spring Specialty Conference GIS and Water Resources VIII – Data to Decisions

Geographic Information Systems (GIS) are an indispensable tool in providing timely and accurate information necessary for making excellent water resources decisions. Emerging technologies in data collection, information management, web and cloud services, and visualization have opened up significant new avenues for sharing solutions across local, state, federal, and international levels. Come and discover new solutions for your organization. The conference is May 12-14, 2014 at the Snowbird Resort in Snowbird, UT. See <http://www.awra.org/meetings/SnowBird2014/>

The United (Watershed) States of America

In 1879, surveyor (and future USGS director) John Wesley Powell proposed that the boundaries of future western states be determined by watersheds, in order to avoid water use conflicts. John Lavey takes this proposal to its logical conclusion, imagining a U.S. in which all 50 states follow watershed boundaries. See: <http://communitybuilders.net/the-united-watershed-states-of-america/>

NHD Photo of the Month

This month's photo was submitted by Linda B Kelly, a GIS Analyst with Chugach National Forest. The photo highlights a section of the Rogue River in Oregon that flows underground through a lava tube. When the water level is low enough, the entire river goes through the tube. This photo shows a view where the river disappears into the tube, taking 35 seconds to travel 200 feet underground to the tube's outlet. This feature is accessible by a trail in the Rogue River-Siskiyou National Forest to the "Natural Bridge." To see the photo of the month go to <ftp://nhdftp.usgs.gov/Hydro/Images/RogueRiver.jpg>. Submit your photo for the NHD Photo of the Month by sending it to kyoder@usgs.gov. This will allow the program to build a library of real-world photos linked to the NHD.

October Hydrography Quiz / New November Quiz

Stephen Daw of the USGS National Geospatial Program was the first to guess the October NHD Quiz as Crater Lake, in southwestern Oregon. See <ftp://nhdftp.usgs.gov/Quiz/Hydrography99.jpg>

Stephen is the Point of Contact for the Watershed Boundary Dataset stewardship program at the USGS National Geospatial Technical Operations Center in Denver, CO. He works closely with data stewards, the Natural Resource Conservation Service, and his colleagues at the USGS to ensure that updates to the dataset meet standards and are processed in a timely manner. He has been working on the WBD edit tool to make sure stewards have an effective tool and associated processes for updating the WBD.

Others with the correct answer (in order received) were: Adam Oestreich, Dennis Dempsey, Steve Shivers, Anji Auger, Kitty Kolb, Gerry Daumiller, Jonathan Labie, Laurie Morgan, Ken Koch, Ron Wencil, Michael Wiedmer, Al Rea, Bill Samuels, Rich Stein, Dean Tucker, Edwin Abbey, Tom Shindler, Tom Christy, Peter Cada, Daniel Button, John Kosovich, David Straub, Roger Barlow, Julia Fields, Barry Puskas, Matt Rehwald, Tom Falk, Peter Roffers, Seth Fitzsimmons, Meredith Webster, Jim Sherwood, Kelly Larvie, Richard Patton, Donna Knifong, Marc Weber, Stephanie Kula, John Watkins, Michael Pipp,

Julie Gott, David Hockman-Wert, Linda Davis, Tom Denslinger, Deborah Naslund, Greg Bazhaw, Evan Hammer, Janet Kellam, Linda Kelly, and Bob Harmon.

This month's hydrography quiz can be found at <ftp://nhdftp.usgs.gov/Quiz/Hydrography100.jpg>. What is the name of this (obviously) man-made lake? Hint; it's in the opposite part of the conterminous U.S. from last month's quiz. The lake has almost 60 square miles of surface area. 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 Pete Steeves, Chris Lund, Tony Litschewski, David Kraemer, Kristina Yamamoto, Gary Ott, John Varndell, Joseph Kerski, and Kathy Yoder.

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.