

Treatment of Estuaries and Coastlines in the NHD – by Keven Roth

There are many ways to define and delineate estuaries. Some delineations deal with legal definitions of “territorial waters” and some have to do with habitat or other environmental concerns. A common definition, and the one used in the NHD is: “The lower end of a river, or a semi enclosed coastal body of water with access to the open ocean, which is affected by the tides and where fresh and salt water mix.” The feature ESTUARY was included in the list of features when the NHD was being developed and the NHDWaterbody feature class has always included a feature type for estuary. However, because of varying definitions and requirements for delineating and describing estuaries, the implementation and delineation was left to state and local partners. In late 2008, several state partners worked to develop guidelines for delineating estuaries and for dealing with how to model flow through or around estuaries.

The NOAA Coastal Assessment Framework (CAF) provides the basis for determining what areas will be classified as the NHD feature ESTUARY. For more details, go to: http://coastalgeospatial.noaa.gov/back_gis.html. The CAF currently identifies 150 estuarine drainage areas. Salinity studies provide additional classification of these 150 estuaries into “Seawater Zone”, “Mixing Zone”, and “Tidal Fresh Zone”. Generally the NHD will include only the Seawater Zone and the Mixing Zone in the feature ESTUARY. The Tidal Fresh Zone will be classified as STREAM/RIVER. If applications require information on the tidal extent of a river, linear referencing can be used to delineate the tidal extent along the stream/river’s artificial path.

While the delineation of an estuary is based on the area where salt and fresh water mix, depending on the configuration of the estuary, supplemented with local knowledge, different methods for treating flow direction through or around estuaries may be used in the NHD. For example, if the estuary is more like “a semi-enclosed coastal body of water” and if the generic part of the name in the NOAA Coastal Assessment Framework (CAF) is “bay”, “sound”, or something similar, the estuary may be treated more like the NHD feature sea/ocean for flow direction modeling. The NHD feature COASTLINE would be used to delineate the edge of the estuary (based on Mean High Water). This COASTLINE could be used to navigate along the edge of the estuary (with the water always to the right.).

If the estuary is more like the “lower end of a river” and if the generic part of the name in the NOAA CAF is “river”, the estuary may be treated more like the NHD feature stream/river for modeling purposes. The NHD feature COASTLINE is used to close off the estuary from sea/ocean. ARTIFICIAL PATHS may be added within the estuary to allow flow to be modeled through the estuary and to a point where the estuary meets the sea/ocean. The delineation of the estuary would still be based on Mean High Water, although the feature COASTLINE would not be collected around the estuary.

For a more detailed explanation and examples of different approaches for managing flow direction, go to: <ftp://nhdftp.usgs.gov/Docs/Estuary.ppt> and ftp://nhdftp.usgs.gov/Docs/Estuary_Coastline_delineation.doc

Canada Hydrography Harmonization – by Karen Hanson and Pete Steeves

In 2008 the International Joint Commission convened a United States- Canada Transboundary Hydrographic Data Harmonization Task Force comprised of representatives from US Environmental Protection Agency (USEPA), U.S. Geological Survey’s Water and Geography Disciplines (USGS), Natural Resources Canada (NRCan), Environment Canada (EC), and Agriculture and Agri-Food Canada to promote the coordination of data harmonization efforts of resource agencies at the federal level in both

countries. The Task Force established two working groups: the Drainage Area Harmonization Group and the International Hydrologic Harmonization Group. The Task Force agreed on a process for comparing and reconciling the Canadian National Hydro Network (NHN) and U.S. National Hydrography Dataset (NHD) delineations of containers or basins that cross the international boundary with focus on the meso-scale, i.e., 1:24,000 – 1:50,000. The relevant containers in the U.S. Watershed Boundary Dataset (WBD) have 8-digit identification codes, and those in Canada's Fundamental Drainage Areas (FDA) have 4-digit codes, and so they are jointly referred to as the US8-CAN4 swath. Currently, these drainage area datasets and associated hydrographic layers do not connect at the international boundary. This has hampered the exchange of information and complicated the understanding of environmental conditions and events along our shared boundary area.

The mission of the USGS includes providing the nation with hydrologic information that can be used to better manage the nation's lands. Assistance to international treaty organizations such as the IJC relates directly to this goal. The final product, complete hydrographically correct drainage areas and network of the U.S.-Canadian border, will be used to update existing Watershed Boundary Dataset and National Hydrography Dataset national datasets to better reflect regional and local drainage patterns and watershed delineations. This database will contain consistent and accurate attributes for harmonized drainage areas along the predetermined shared drainage area containers (US8-CAN4 swath) and will provide a framework for the incorporation of other relevant data layers and a basis for regional assessments of our shared water resources.

The Task Force, formed within the context of the International Watershed Initiative, has agreed on protocols for merging drainage area container and hydro network information from each country within the US8-CAN4 swath and a process for reporting the harmonized containers back to each country for incorporation into the Canadian NHN, U.S. NHD, and U.S. WBD. This current effort is scheduled to be completed by the end of Fiscal Year 2010. In FY 2011 focus will expand to harmonize the WBD 10- and 12-digit codes across the border with Canada.

Reprojection Tool Updated – by Greg Enstrom

A new Reprojection Tool version 2.0 has been updated by the U.S. Forest Service and is ready to use. It will soon be posted on the NHD web site at <http://nhd.usgs.gov/tools>, but until then version 2.0 can be accessed at: ftp://ftp2.fs.fed.us/incoming/wo/nris/water_abat/Reprojection_Tool_v2. Reports are that the new tool works well. Just ftp it, and then double-click on the .msi file and it will all set itself up. Its no longer in a zip file - the .msi file alone sets it all up on your PC. The full help documentation/discussion is in the toolbar and may be saved as a Microsoft .rtf file. The tool is no longer limited to the relatively smaller personal geodatabases. It now goes from any format to any format, works back and forth between personal geodatabases, and file geodatabases, and works within to/from ArcSDE sources or targets. It does whole datasets or whole geodatabases and doesn't change the original extent with the 20% buffer that the old one did. The 2.0 version of the tool only works in ArcGIS 9.2, however, a version 2.1 will be available very soon to work in ArcGIS 9.3.

Here's an overall summary of the changes we made: This version (2.0) is a complete rewrite of the original tool. It uses a much simpler and more efficient algorithm for reprojecting the data. This allows for much more functionality and decreases the code base by orders of magnitude. This will increase robustness, usability and maintainability. All functionality of the original tool is carried through to this version with the addition of the following improvements and bug fixes.

1. The USFS Reprojection Tool v.2.0 now works with file based and personal geodatabases/datasets and SDE datasets with the obvious exception of not converting a whole SDE geodatabase or converting a geodatabase to a whole new SDE setup. Effectively SDE is a geodatabase, so only datasets may be used as sources or targets of reprojection.

2. Allows automatic conversion from any format listed above to any other, i.e. directly reproject a personal geodatabase to a file geodatabase.
3. Allows for the editing of spatial reference values, other than precision and x/y domain. The user now has all of the normal functionality as if creating a new dataset.
4. Can be used as a tool to change properties of a dataset that are not usually editable. i.e. 'reproject' a dataset to the same projection of the original, but change the domain values.
5. If when adjusting spatial reference values (i.e. extents) the user selects a value that does not make sense the application will automatically and transparently adjust the erroneous value to something that works.
6. No longer assumes that all feature classes in the geodatabase are in the same projection.
7. Fixed bug – old version assumed only forward datum transforms. i.e. if user selected NAD_1927_To_NAD_1983_NADCON and was in 'NAD_83' the user could not go back to 'NAD_27'. The forward shift would be applied again.
8. Fixed bug – old version did not deal with changes due to projection distortions. i.e. with many projections the shapes distort possibly exceeding the size of the envelope. This would cause the reprojection to fail. The solution had been to simply expand the envelope by 20%. This by no means solved the problem, although it would 'work' most of the time. The new tool deals with these distortions in an appropriate manner. The envelope will now only change if necessary.
9. Fixed bug – old version would force the user to exit the application and edit the registry settings if a personal database was too large. The new tool automatically (and temporarily) adjusts those setting transparently.
10. Fixed bug – old version forced user to exit application and upgrade the precision of a pre- 9.2 database. This is now done automatically and transparently.
11. Fixed bug – old version could not project datasets with spatial references labeled 'unknown'.
12. Fixed bug – old version did not refresh the treeview. The new tool will refresh the treeview to show the newly created objects, and automatically highlight the new 'parent' object.
13. Fixed bug – A previous fix stated the tool allowed for cancellation, this feature was removed from the UI for some unknown reason. The new tool reinstated that ability to cancel the process.
14. Fixed bug – Cleaned up extension mechanics, for example, now if extension is uninstalled the button will no longer be enabled when a dataset is selected.

The version 2.1 update will do three things:

1. Handle ArcGIS 9.3.
2. Prompt the user to ask if they want to drop the network (if the user says no" the process will stop).
3. If there are no datasets in the input, the Reprojection will still occur. (Previous versions required everything to be in a dataset).

Update on Dams

The USGS is actively adding to the database of dams in the NHD NHDPointEventFC feature class. Dams are queued from various sources, and then verified before going into the NHDPointEventFC. Four conditions must be met: (1) must be in a source dam's database, (2) must be observed on imagery, (3) must be located on an NHDFlowline, and (4) must be independently referenced in some form on the web. To date there are 20,140 dams verified and in the NHDPointEventFC. This means that the dam is both located as geospatial feature and is located on the NHD network using a network address. Work on streamgages is on hold with 23,216 streamgages located.

ESRI User Conference

Mark your calendar for these NHD related events at the upcoming ESRI International User Conference in San Diego the week of July 13. Learn more at <http://www.esri.com/events/uc/>.

Tuesday, July 14

10:15AM - 11:30AM, Rm. 25C, **Datasets for Water Resources Analyses: Special Topics**

Hydro Geodatabase Development Using the ArcHydro Extension and LiDAR Data

The Curse of LiDAR - Lesson's Learned since 2003

A National Vision for use of Spatially Distributed Precipitation Data

The Role of Time-Series Management in Hydrology

Wednesday, July 15

12:00PM - 1:00PM, Rm. 25C, **Special Interest Group Meeting: NHD Meeting**

This meeting will be a gathering of Water Resources professionals to discuss their current issues and how they are using NHD and ESRI solutions in their work.

Thursday, July 16

8:30AM - 9:45AM, Rm. 25C, **NHD Maintenance and Applications**

Integrating Local Knowledge into the National Hydrography Dataset (NHD)

Improvements in Modeling Water Resources in West Virginia

New Jersey's High Resolution NHD Conflation Project 1:2,400 Scale

Generalization of the National Hydrography Dataset

10:15AM - 11:30AM, Rm. 25C, **NHDPlus in Action**

National Hydrography Dataset Plus (NHDPlus) User Tools

Regional Application of NHDPlus for NAWQA SPARROW Modeling

Web Services and the National Hydrography Dataset Plus

12:00PM - 1:00PM, Rm. 25C, **Water Resources User Group**

See the latest techniques being used in Water Resources through the use of GIS.

Hawaii NHD GIS Specialist Needed

Recruitment for a Geospatial Information Specialist to spearhead Hawaii National Hydrography Dataset (NHD) editing and maintenance begins June 23 and closes July 6. This is a two-year position at the State of Hawaii Department of Health (Honolulu), funded with ARRA money awarded by USEPA to the State Water Quality Management Program. Please refer qualified applicants to the recruitment notice at www.rcuh.com (follow Employment links), and call me with any questions. David C. Penn, TMDL Coordinator, Environmental Planning Office, State of Hawaii Department of Health, Phone (808) 586-4337, Fax (808) 586-4370, david.penn@doh.hawaii.gov, <http://www.hawaii.gov/health/epo>.

New Hydrography Intern at USGS

The USGS has a new hydrography intern on-board at the National Geospatial Technical Operations Center. Kathy Isham is a senior at the University of Colorado-Denver majoring in Geography with a certificate in GIS and a minor in Geology. She will be graduating in December and after that her ambition is to pursue a career with the USGS to put her GIS knowledge and interest in water resources to work. She will work full-time over the summer and part-time during the school year. Her main duty will be to revamp the NHD web site while gradually learning more and more about the NHD and WBD. Kathy's experience at USGS is making her realize that graduation is only a milestone in a career-long education program. Already she is lining up classes to take after she graduates. Kathy has lived in Colorado for 11 years but has also lived in Texas and Virginia. She loves to travel, and most recently

went on a study abroad to the island of Grenada where she learned about the island's water quality and waste-water disposal methods.

AWRA Conference – Call for Abstracts

The American Water Resources Association's popular series of conferences on GIS & Water Resources continues with its sixth GIS & Water Resources conference, this time in Orlando, FL in March of 2010. The Call for Abstracts will be online in May 2009. Planning is underway for this important GIS event coming to the southeastern United States. Presentations will cover a broad range of subjects on integrative geospatial hydrologic technologies. Plan to submit an abstract and join us to network and experience what your colleagues are doing with GIS and Water Resources. Meet the leaders of geospatial and hydrologic technologies using and applying their skills in the sessions, exhibit hall, Opening Reception, luncheon, workshops, field trip, and networking events. AWRA's Spring Conference will be packed with opportunities for you to learn more, network, and be entertained. Visit <http://www.AWRA.org> for the latest information!

May Hydrography Quiz / New June Quiz

Gary Penn was the first to correctly guess the May hydrography quiz as Lake Oahe in South Dakota and North Dakota. Gary is a GIS coordinator and webmaster with the Office of Environmental Services at the Ohio Department of Transportation in Columbus, Ohio. Steve Shivers is the USGS geospatial liaison to these two states and his name was the hint used for the quiz. Others who identified the Lake were (in order received): Mitch Adelson and Joanna Wood. For miles of shoreline, U.S. Lakes listed in order are: (1) Lake Oahe – 2,190; (2) Lake Powell – 1,858; (3) Fort Peck Lake – 1,533; (4) Kentucky Lake – 1,519; (5) Audubon Lake – 1,508; (6) Toledo Bend Reservoir – 1,264, (7) Lake Cumberland – 853; (8) Lake of the Ozarks – 824; (9) Watts Bar Lake – 809, and (10) – Bull Shoals Lake – 808.

For this month's hydrography quiz see <ftp://nhdftp.usgs.gov/Quiz/Hydrography47.pdf>. The black line is the international border (from the National Atlas). What's the name of this reservoir dedicated by President Nixon. Send your guess to jdsimley@usgs.gov.

Upcoming NHD Maintenance Training

July 28-31, Albany, NY. Contact David Anderson (danderson@usgs.gov) and Cheryl Rose (cdrose@gw.dec.state.ny.us)

September 15-17, Augusta, ME. Contact David Anderson (danderson@usgs.gov) and Anji Redmond (anji.redmond@maine.gov)

Upcoming NHD Applications Training

July 29, Albany, NY (short version 1/2 day) -Contact David Anderson (danderson@usgs.gov) and Cheryl Rose (cdrose@gw.dec.state.ny.us)

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 Keven Roth, Karen Hanson, Pete Steeves, Greg Enstrom, David Penn, and Kathy Isham. 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.