**Statistics on the Nationwide High Resolution National Hydrography Dataset**

With nationwide NHD coverage now available it's possible to get some statistics on the dataset. The nationwide high resolution NHD contains 26,734,459 features. This is composed of 18,509,731 flowline features with a total stream length of 11,368,174 kilometers or 7,063,842 miles. The NHD contains 6,376,110 lake/ponds. These numbers represent the total number of miles of rivers and streams in the U.S. Keep in mind that a stream is defined as perennial and intermittent streams large enough to be represented on a 1:24,000-scale map and selected to provide cartographic consistency. Highly dense stream networks in high precipitation areas may be under-represented, while thin networks in low precipitation areas may be over-represented for a given streamflow. In general a stream is represented relative to the surrounding landscape. What might be insignificant in a wet or highly developed landscape might be significant in an arid or sparse landscape. Lakes and ponds follow similar selection criteria, with lakes of any size shown in arid areas and lakes with a minimum shortest dimension of 100 feet shown in non-arid areas.

**The Land of 10,000 Lakes**

Minnesota's license plates proudly proclaim the land of "10,000 Lakes", but what does the NHD have to say about the number of lakes in Minnesota. To conduct a count, one would look at the NHD feature class NHDWaterbody and add up the number of Lake/Pond features, which totals 127,788. The size of Lake/Ponds in the NHD can be found in the AreaSqKm field. The minimum shown is 0.001 square kilometers, which is about a quarter of an acre. So a lot of very small lakes are showing up in the NHD. In Subregion 0701 for example, which falls fully within central Minnesota, there are 47,744 Lake/Ponds of which about one-half are a quarter acre in size. In fact, of the Lake/Ponds in this subregion, only about one-third of them are one acre or larger. Only one-percent of the Lake/Ponds are one square kilometer or larger and only one-half of one-percent are one square mile or larger. To extrapolate using subregion 0701, the 10,000 lakes proclaimed on Minnesota's license plates, would be lakes of about 16 acres or larger.

**Crenulated Streams in the NHD**

Some users of the NHD require a greater stream density than that which appears in the standard 1:24,000-scale representation known as the High Resolution NHD. The NHD program is willing to allow this greater stream density because it improves the applicability of the NHD and because this "extra" density can be thinned out if necessary. There are various methods to achieve greater density, primarily related to photo interpretation, but also from some emerging technologies such as LIDAR. Another method is through the interpretation of crenulations in elevation contours. Streams normally cut an indentation in the terrain, which are reflected in the contours as uphill pointing "V's", or "crenulations." The more major of these crenulations will be bisected with a stream as represented in the NHD. The U.S. Forest Service believes that many of the "non-stream" crenulations also represent streams, albeit of a less major nature. By interpreting the crenulations and plotting a stream-line to bisect the crenulations, then linking them to existing streams, it is possible to densify the stream network using a logical technique. This method remains somewhat controversial amongst a few, but the ability to thin out the crenulated streams is a reasonable response to the concern. The crenulated streams are classified with NHDFlowline FType code of 46007 – Ephemeral Stream. A primary method to thin the crenulated stream is to "turn-off" FType 46007. Crenulated ephemeral streams are currently only being generated on U.S. Forest Service

land.  A good example of crenulated ephemeral streams is to look at the Blue River subbasin in Colorado, subbasin 14010002.  This subbasin with a good perennial/intermittent stream representation contains 1,228 km of perennial streams, 923 km of intermittent streams, 67 km of artificial path in double-line streams, plus an additional 149 km of artificial path in NHDWaterbody.  The crenulated ephemeral streams add 1,141 km to the network.  This is composed of 3,133 records for an average of 0.36 km per record with a record normally representing a unique tributary stream.

## USGS Commissions Team to Study Perennial/Intermittent Stream Classifications

The USGS has commissioned a team to study the classification of perennial and intermittent streams in the NHD.  Issues to be addressed concern an assessment of the current classification and proposals for improving the classification.  Traditional methods relied very heavily on air photo interpretation with field verification.  This resulted in an overall satisfactory approach.  However, climate change, landscape change, human engineering, inconsistencies in mapping, project policies and a number of other variables present opportunities for improvement.  New methods using hydrologic modeling in GIS with field checking may yield better results.  This will be an extremely challenging problem and subject to intense scrutiny.  Many legal issues throughout the country are tied to these classifications.

## August Hydrography Quiz / New September Quiz

Al Rea, a Hydrologist with the USGS Idaho Water Science Office, was the first to correctly guess last month's hydrography quiz ftp://nhdftp.usgs.gov/Quiz/Hydrography26.pdf as "Triple Divide" in Montana where the continental divide splits into three drainages to flow to the Pacific Ocean, Gulf of Mexico, and Hudson Bay.  Al is one of the top experts in the U.S. on the application of GIS in hydrology.  He has been instrumental in the development of processes in NHDPlus and StreamStats using the NHD, the National Elevation Dataset, and a number of other databases leading to the generation of predicted streamflow information.  Others with the correct answer were Laurie Morgan, Greta Resch, Greg Enstrom, Tom Christy, and Ben Adams.  Laurie points out http://en.wikipedia.org/wiki/Triple_Divide_Peak.

This month's hydrography quiz can be found at ftp://nhdftp.usgs.gov/Quiz/Hydrography27.pdf.  The two large lakes total 444 square miles is size.  Where is this?

## Upcoming NHD Geo Edit Tool Training

October, 15-19 Tallahassee, Florida, Contact Carl Nelson cwnelson@usgs.gov or David Anderson at David.S.Anderson@dep.state.fl.us
(Possibility), Anchorage, AK, Contact Paul Kimsey pjkimsey@usgs.gov or Carl Markon markon@usgs.gov

## Upcoming NHD Applications Training

October 2, 2007 Austin, TX, contact Claire DeVaughn at cdevaugh@usgs.gov
(Possibility), Hawaii, contract Henry Wolter at hwolter@usgs.gov
(Possibility), Michigan, contact Steve Aichele at saichele@usgs.gov
(Possibility), California, contact Carol Ostergren at costergren@usgs.gov

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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.