

The National Hydrography Dataset

NHD QuickStart

The National Hydrography Dataset (NHD) is a vector geospatial theme for surface water hydrography obtained from topographic maps and additional sources. It is available Nationwide as medium resolution at 1:100,000-scale, and in much of the Country as high resolution at 1:24,000-scale or better. A few “local resolution” areas are also available at varying scales. The NHD is available in ESRI geodatabase format known as NHDinGEO, in ESRI coverage format known as NHDGEOinARC, and in ESRI shapefile format known as NHDGEOinShape. The NHD is organized by hydrologic units, but can be downloaded in various extents.

Obtaining NHD Data

To obtain the NHD, go to <http://nhd.usgs.gov/data.html>, then click on the “Go to the NHD viewer” link. The viewer provides the ability to check on the availability of the data, view the data directly, and obtain the data. Polygon Extracts can be created using one of the following reference polygon layers: Subbasins, Counties, 108th Cong Districts, or one of the USGS Quad index layers. Data can be extracted in blocks encompassing several adjacent reference areas.

You may select and extract up to 5 high resolution, or up to 10 medium resolution, NHD subbasins as a single personal geodatabase. Extract requests will process at the USGS and become available in a few hours based on the choice of formats noted above. Another option is to download pre-staged personal geodatabases by subregion from the NHD ftp site, <ftp://nhdftp.usgs.gov/SubRegions>. Select the High, Local, or Medium resolution folder. The pre-staged subregion geodatabases will be kept up-to-date as revised data become available.

Using the NHD

The following *QuickStart* exercise will use the NHDinGEO format in ESRI’s ArcGIS ArcMap.

Once NHDinGEO data have been obtained for the area of interest, it must be unzipped. This will produce one Microsoft Access file, which is the database used for the NHD. It is useful to rename the file based on personal preference such as *subbasin* name.

Viewing the NHD

1. Open ArcMap and select the “Empty map” option.
2. Click on the “Add Data” icon.
3. Browse to the data and double-click on the Access file. Two *Feature Datasets* are listed in addition to a number of object classes. Click on the “Hydrography” feature data set. This contains the spatial part of the NHD. Click on “Add”.
4. The NHD data will display along with a Table of Contents (TOC) to the left.
5. The TOC for the Hydrography Feature Dataset will list six Feature Classes:
 - a. HYDRO_NET_Junctions – Nodes between NHDFlowlines used by the geometric network for flow navigation.
 - b. NHDFlowline – The core linear network of the surface water drainage system primarily consisting of streams, and artificial paths through polygons.
 - c. NHDWaterbody – Polygons representing areal hydrographic waterbody features such as lakes.
 - d. NHDPoint – Points representing hydrographic landmark features.
 - e. NHDLine – Line features representing linear hydrographic landmark features.
 - f. NHDArea – Polygons representing areal hydrographic landmark features.
6. To change the symbology:
 - a. Double-click on the symbol in the TOC.
 - b. Choose the appropriate graphic, color and size.
7. The HydrologicUnits feature data set contains the watershed boundary data, and can be added similarly to the Hydrography feature dataset. It is used as a *reference theme* only, and although related to the NHD, it is not a part of the NHD.

Navigating the NHD Flow Path

1. It is possible to find the path upstream or downstream from any point on the NHDFlowline network using the Utility Network Analyst that comes standard in ArcMap. The NHD has been pre-processed to create a flow network. To activate this toolbar:
 - a. Click on “View”, “Toolbars”, then check the “Utility Network Analyst” box.

- b. The Utility Network Analyst toolbar will appear with the Hydro_Net_Junctions network automatically selected.
 2. Start navigation by clicking on the “Add Edge Flag” tool. Select to start at a *node* or a *midpoint* by clicking on the appropriate icon. In either case, the entire NHDFlowline feature will be included in the navigation result.
 - a. Click cursor at appropriate point on any NHDFlowline.
 - b. Select “Trace Task”:
 - i. Trace Downstream – finds all paths downstream including divergences.
 - ii. Trace Upstream – finds all paths upstream including branches.
 - c. Click on “Solve” icon - it’s at the right end of the Utility Network Toolbar. The navigation will highlight the appropriate NHDFlowlines.
 - d. It is possible to stop the navigation path using a barrier. Two barrier icons can be found in the *Add Edge Flag* tool. Click on the icon, and then click on a point on the NHDFlowline where the path is to stop.
 - e. To clear result and navigate another path, click on “Analysis”, then “Clear Flags”, “Clear Barriers” or “Clear Results”.
 - f. To do a point-to-point navigation, start upstream, use a downstream barrier, and trace downstream.
 3. Select “Features” using the Navigation Path. The method above provides the navigation path using a graphic. It may be desirable to select NHDFlowlines on the navigation path for network analysis.
 - a. Click on “Analysis” in the Utility Network Analyst toolbar, then click “Options”, and “Results”.
 - b. Click on the “Selection” radio button, “Apply”, then “OK”.
 - c. Perform navigation. The navigation path will indicate selected NHDFlowlines.
 - d. To see the attribute table of the selected NHDFlowlines, right click on NHDFlowline in the TOC on the left side of the screen. The attribute table will appear with the appropriate NHDFlowlines selected.
 - e. To save the selected NHDFlowlines as a Shapefile, right click on NHDFlowline in the TOC, scroll to Data, then click on “Export Data”. A pop-up window will appear to name the new Shapefile.