

DEVELOPMENT AND STEWARDSHIP OF LOCAL-RESOLUTION NHD DATA FOR INDIANA

A Partnership Program Between the U.S. Geological Survey,
the Indiana Geographic Information Office, and
the Indiana Geographic Information Council

Introduction:

The National Hydrography Dataset (NHD) is a feature-based GIS database that interconnects and uniquely identifies the stream segments (or reaches) that comprise the nation's surface water drainage system as part of a National Spatial Data Infrastructure (NSDI)*. The NHD is a nationwide effort designed to meet the needs of many interests. Many state and federal agencies and organizations collect and analyze water resources data, and utilize hydrographic information in spatial analysis. Federal and state power users of NHD data include the geological surveys, forest services, environmental protection agencies, natural resource agencies, homeland security/emergency management agencies, and departments of agriculture.

For Indiana, a statewide high-resolution NHD dataset is complete at a scale of 1:24,000 (1"=2000') compiled from USGS Topographic Quad maps. IGIC's Water Framework Data Workgroup has identified this existing high-resolution NHD dataset for improvement. While the NHD is very useful in its current state, it also has its drawbacks. The data originated from digitizing water features as they appear on paper 1:24,000 USGS Topographic Quad maps. Most of those maps are more than 20 years old. Man-made and naturally occurring changes to water features since that time are not reflected in the NHD, the level of hydrography feature detail is limited, and the horizontal and vertical accuracy of the data limits its reliability (+/- 40' horizontal and ~10' vertical accuracy). Results from a recent IGIC Waters Framework Data stakeholder survey show that nearly 70% of Indiana respondents (State and Local Government users) need more up to date, detailed and accurate Local-Resolution hydrography data.

Fortunately, the the USGS encourages and the NHD is designed to incorporate the development of the more detailed and accurate Local-resolution NHD data that is required by many users. As a direct result of this program, the federal and state power users as well as County Surveyors, City Engineers, Planners, local highway departments and others in Indiana will significantly increase their use and reliance on this local-resolution NHD data being developed.

Scope of Work:

This program will produce Local-resolution NHD data for the 38 HUC8** watershed subbasins that cover the state of Indiana (see Figure 1). Production of Local-resolution NHD starts with capturing new 3-D vectors (lines, points and areas) features depicting all streamlines and water bodies (including single-line streams, double-banked streams, water bodies, artificial paths, islands, and connector lines). This 3-D data will be captured from the 2005 statewide orthoimagery and the associated near bare-earth DEM data. Where available, local government hydrography vector data developed from newer imagery will also be utilized. The next step is to conflate all attribute information from the existing High-resolution 1:24,000 (1"=2000') NHD to the new Local-resolution 1:1,200 (1"=100') or 1:2,400 (1"=200') hydrography data.

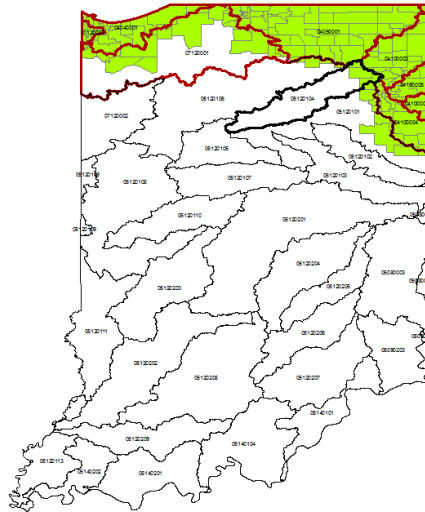


Figure 1

Using this process will greatly improve the geographic, topology, and attribution accuracy of the National Hydrography Dataset for the Indiana subbasins. In Figure 2 below the 1:24,000 High-resolution NHD data for one stream is shown in red over new 1:1200 Local-resolution NHD data in blue.

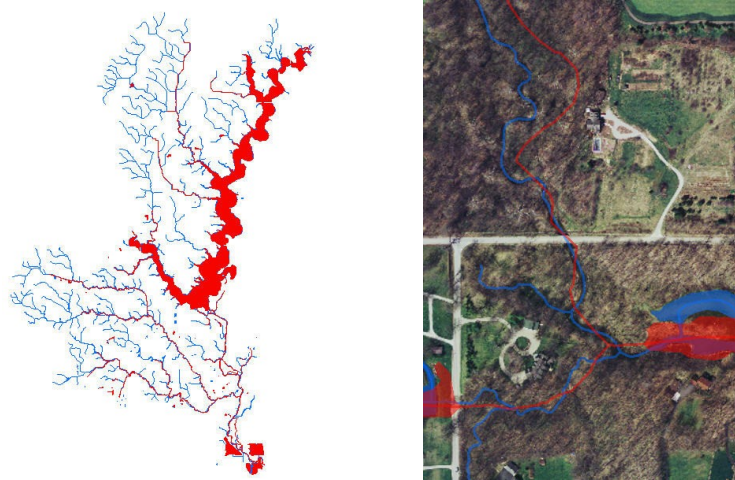


Figure 2

As can be clearly seen in this figure, the new Local-resolution NHD data provides a more detailed hydrology network model of each stream, and more accurate (X,Y, and Z) geographic locations for each feature. After completing each subbasin, the new Local-resolution data will be delivered to the USGS for review and acceptance. Upon acceptance, these datasets will be loaded by the USGS onto *The National Map*, and IGIC will load the new data on the IndianaMap.

Project Funding and Costs:

This project budget is based upon capturing local-resolution streamlines using a minimum 6-acre drainage basin areas:

Source Data	Statewide Cost	Sq. Mi. Cost
2005 Orthos/DEMS and Local Res Vector Data >= 1:2,400	~\$1.3 million	\$36.00

Since the statewide project is being performed and completed by HUC8 subbasins, we utilize the square miles of each HUC8 subbasin to calculate its cost. Work will be performed and completed by individual subbasins as funds become available.

Phase 1:

Funds are currently available from IDEM (\$200,000.00) and from the USGS (\$29,000) to develop the first phase of Local-resolution NHD production. Phase 1 covers the Great Lakes Initiative (GLI) area of Northern Indiana (See Figure 3). For Phase 1, nine HUC8 subbasins will be produced. IDEM is funding the eight subbasins outlined in red, and USGS is funding the one subbasin outlined in black on figure 3.

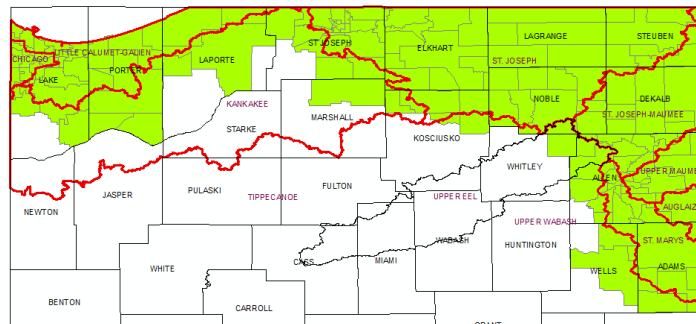


Figure 3 – Phase 1 Watersheds (GLI Area Shown in Green)

Phase 2 and Beyond:

Other specific priority areas in the state will be determined based on local or regional priorities and the availability of program funding. Some examples of potential priority and funding opportunities are:

- U.S. Forest Service Areas (US Forest Service)
- Agricultural Areas (NRCS)
- Ohio River Basin (EPA)
- 2008 Flood Areas (FEMA / USGS)
- Urban Growth Areas - Storm Water Drainage (INDNR & IDEM)

The table below lists the remaining 29 HUC8 subbasins and their calculated costs:

Item	HUC_8	SQ_MI	COST
1	5080001	33	\$1,188.00
2	5080002	64	\$2,304.00
3	5080003	1,331	\$47,916.00
4	5090203	807	\$29,052.00
5	5120101	1,333	\$47,988.00
6	5120102	560	\$20,160.00
7	5120103	788	\$28,368.00
8	5120105	670	\$24,120.00
9	5120106	1,949	\$70,164.00
10	5120107	805	\$28,980.00
11	5120108	2,066	\$74,376.00
12	5120109	137	\$4,932.00
13	5120110	812	\$29,232.00
14	5120111	1,124	\$40,464.00
15	5120113	666	\$23,976.00
16	5120201	2,722	\$97,992.00
17	5120202	1,674	\$60,264.00
18	5120203	1,208	\$43,488.00
19	5120204	1,166	\$41,976.00
20	5120205	599	\$21,564.00
21	5120206	813	\$29,268.00
22	5120207	1,141	\$41,076.00
23	5120208	2,029	\$73,044.00
24	5120209	862	\$31,032.00
25	5140101	678	\$24,408.00
26	5140104	1,254	\$45,144.00
27	5140201	990	\$35,640.00
28	5140202	527	\$18,972.00
29	7120002	844	\$30,384.00
Total:		29,652	\$1,067,472.00

FOOTNOTES:

***Background:**

OMB Circular A-16 Created by the Office of Management and Budget (OMB) to provide guidance for federal agencies that create, maintain or use spatial data directly or indirectly through the establishment of the National Spatial Data Infrastructure (NSDI) and the Federal Geographic Data Committee (FGDC). The Circular describes “Coordination of Geographic Information and Related Spatial Data Activities” to provide improvements and use of spatial data. Spatial data refers to information about places or geography, and has traditionally been shown on maps.

The National Spatial Data Infrastructure (NSDI) The NSDI ensures that spatial information is accurate and available to state, local, and tribal governments as well as to academia and the private sector. A cooperative relationship between Federal, State, and local geospatial data producing agencies is essential for the development of the NSDI and successful implementation of The National Map.

The National Map is a consistent framework for geographic knowledge needed by the Nation. It provides public access to high-quality, geospatial data and information from multiple partners to help support decision-making by resource managers and the public. *The National Map*, including NHD, is the product of a consortium of Federal, State, and local partners who provide geospatial data to enhance America's ability to access, integrate, and apply geospatial data at global, national, and local scales.

The success of The National Map depends on partnerships established with the wide variety of organizations that work with geospatial data. The NSDI recognizes the most current, highest resolution, and continuously maintained geospatial datasets reside with State and local governments, private entities, and other Federal agencies. The role of the USGS as manager of The National Map is to establish partnerships with these organizations to coordinate and negotiate access to their data, develop protocols for data integration, develop data maintenance processes, and define data requirements.

The development and stewardship of Local-resolution NHD data in the State of Indiana is an excellent example of a partnership between the U.S. Geological Survey, the Indiana Geographic Information Office, and the Indiana Geographic Information Council. For the State of Indiana, our partnerships with the USGS and contributions to the National Map are also available through our own IndianaMap portal (www.indianamap.org).

****NHD data is mapped by watersheds**

Watersheds are geographic areas within a drainage divide. Watershed boundaries follow the highest ridge line around the stream channels and meet at the bottom or lowest point of the land where water flows out of the watershed. Each watershed boundary is assigned a unique Hydrologic Unit Code (HUC). A HUC consist of a two to twelve digit number based on six levels (sizes) of geographic classification:

- 2-digit HUC first-level (region)
- 4-digit HUC second-level (subregion)
- 6-digit HUC third-level (basin unit)
- 8-digit HUC fourth-level (subbasin unit)**
- 10-digit HUC fifth-level (watershed)
- 12-digit HUC sixth-level (sub-watershed)

Watershed management applications typically focus on the 8-digit hydrologic unit, therefore existing NHD data is organized and managed by the USGS using HUC8 areas called subbasins. The HUC8 subbasins areas are also given local names for easy identification. The IndianaMap NHD Maintenance and Update Workflow is organized by HUC8 subbasin areas. Along state boundaries, the standard practice is to work the subbasin to the nearest confluence outside the state boundary. Within each HUC8 subbasin, catchment areas of approximately 6 acres will be defined to build the new Local-resolution NHD model.