Applying the National Hydrography Dataset Plus (NHDPlus) to Water Quality Assessments

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NHDPlus: A Geospatial Surface Water Framework
NHDPlus

- An set of application-ready, geospatial, surface water data products
- Spatial and functional integration of NHD, NED, and WBD
- The first national integration of these datasets
National Hydrography Dataset (NHD)

A national framework dataset that includes:

- Hydrographic features for making maps
- A national stream addressing system for linking information to the surface water
- A surface water network for navigating upstream/downstream
- Multi-resolution – 1:100K, 1:24K and better
- Maintenance Infrastructure – User updates
National Elevation Dataset (NED)

A national framework dataset that includes:

- Seamless elevation data for the US
- Sources - Primarily map contours
- Multi-resolution - 30, 10, and 3 meter
- All resolutions built by re-sampling from best available data
Watershed Boundary Dataset (WBD)

A national framework dataset that includes:

- Standardized hydrologic divisions of the landscape
- Six levels of nested divisions called hydrologic units
- Region, Subregion, Basin, Subbasin, Watershed, Subwatershed
- Hierarchical coding system – 2, 4, 6, 8, 10, and 12 digits

<table>
<thead>
<tr>
<th>Watershed Definitions</th>
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<tbody>
<tr>
<td><strong>Name</strong></td>
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<tr>
<td>Region</td>
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<td>Subregion</td>
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<td>Basin</td>
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<td>Subbasin</td>
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<tr>
<td>Watershed</td>
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<td>Subwatershed</td>
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</tbody>
</table>
NHD and WBD Hydrologically Condition the NED

WBD Boundary Cells "walled" into Elevation

NHD Stream Cells "burned" into Elevation
NHDPlus
Links the Mapped Stream Network to the Landscape
NARS and NHD/NHDPlus: A Symbiotic Relationship

- Sample Frame Selection
- Sampling Field Work
- Analysis
NHD Updates to Support 2007/2012 NLA Survey

• 2007 NLA updates from lake frame design efforts
• 2007 NLA updates from survey field work - lake/pond additions, geometry edits, “not a lake” feature type errors
• National Lake Fish Tissue Study - “Not A Lake” feature type errors
• NHD Lost lake polygons
NHDPlus Analysis to Support Lake Surveys

- Lake Polygon Dataset – with area, perimeter, and lake shoreline development
- Buffered lake landscape characteristics – NLCD land use classifications allocated to 100m lake buffer
- Basin/Watershed Delineation – with area
- Basin/Watershed Characteristics – NLCD land use classifications allocated to basin
2007 NLA Sampled Lake Polygons

Area = 3.59 sq km
Perimeter = 53.49 km
Shoreline Development = 7.9
2007 NLA Sampled Lake Buffer Attributes

**NLCD 2001 Land Use**
- Residential = 0.112 km²
- Forest = 4.04 km²
- Agriculture = 1.112 km²
- Wetlands = 1.741 km²
2007 NLA Sampled Lake Basins

Basin Area = 114.24 km²

NLCD 2001 Land Use
Residential = 7.86 km²
Forest = 86.42 km²
Agriculture = 12.64 km²
Wetlands = 7.32 km²
NHD/NHDPlus Updates to Support Rivers and Streams Surveys

- Enhancement to stream order algorithm
- Correction of flow direction
- Connection of isolated stream networks
- Linear names Corrections
NHDPLUS Improved Strahler Stream Order
Using Flow Accumulation Grid to Connect Isolated Networks

Blue lines are NHD flowlines

Red lines are cells with high values in the flow accumulation grid
NHDPlus Analysis to Support Rivers and Streams Survey

- **Slope** – Using NHDPlus stream segment lengths, elevations and slopes
- **Sinuosity** – Using NHDPlus geometry
NHDPlus Smoothed Elevation Stream Profile
• Site Latitude/Longitude, Reach Length
• Bottom Lat/lon = site lat/lon – ½ reachlength
• Top lat/lon = site lat/lon + ½ reachlength
• Elevations at T and B = prorated NHDPlus elevations
Linking Data to the NHD/NHDPlus

Waterbody Reach: 060301002002785 + shape

Linear Reach: 02020005000375
Measure: 48.247

Linear Reach: 05030204004722
From Measure: 15.0
To Measure: 90.00

Area Links

Linear Links

Point Links
Linking NARS to the Water Resources Community Through NHD Reachcodes

- NARS Survey Data
- NHD/National Hydrography Dataset Plus
- Water Resources Data
  - NHD/NHDPlus National User Community
- WQSDB
  - Water Quality Standards
- STORET
  - Water Quality Monitoring
- ATTAINS
  - Water Quality Assessments, Impaired Waters & Total Maximum Daily Loads
- NWIS
  - USGS Stream Gages
  - USGS Stream Gages
Linking NARS Surveys to Each Other

NLA 2007 Survey
Site ID: NLA06608-0041

Fish Tissue Survey
Site ID: OWOW99-0637

NHD Reachcode: 05050005001472
Linking NARS Surveys Spatially or Hydrologically
Linking NARS to Water Resources Community

NLA 2007 Survey
Site ID: NLA06608-0041

Fish Tissue Survey
Site ID: OWOW99-0637

NHD Reachcode: 05050005001472

Gage height, feet
Most recent instantaneous value: 6.72  04-23-2010  16:30 EDT
NARS ↔ NHD/NHDPlus
a work in progress

Questions?