Representing Different Hydrologic Conditions in Geospatial Hydrographic Networks

Alan Rea, USGS
Tommy Dewald, USEPA
Cindy McKay, Horizon Systems
Problem:

- Hydro network connectivity may not be static.
- Different hydrologic conditions need different networks, for example:
  - Irrigation canals are seasonal.
  - Some connections may only exist during floods.
  - Many other situations.
- NHD network is either connected or not connected—need this to be dynamic.
A Solution: NHDPlus Scenarios

- Non-geometric user editable tables:
  - DivFracMP.dbf
  - PlusFlow.dbf
  - PlusARPPointEvent.dbf
  - PlusFlowAR.dbf

- Re-run VAA’s, which changes these tables:
  - CumulativeArea.dbf
  - elevslope.dbf
  - PlusFlowlineVAA.dbf

- All tables are in NHDPlusAttributes folder—keep separate folder for each scenario
Discharge, cubic feet per second

USGS 13203000 NEW YORK CANAL BL DIVERSION DAM NR BOISE ID

DAILY Discharge, cubic feet per second

-500 0 500 1000 1500 2000 2500 3000


Daily mean discharge
Estimated daily mean discharge
Period of approved data
NHDPlusV2 Diversions
Spatial Representation

Divergence Fraction Table

<table>
<thead>
<tr>
<th>Node Number</th>
<th>ComID</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C1</td>
<td>0.75</td>
</tr>
<tr>
<td>1</td>
<td>C2</td>
<td>0.25</td>
</tr>
<tr>
<td>3</td>
<td>C6</td>
<td>1.0</td>
</tr>
<tr>
<td>3</td>
<td>C7</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Different tables to represent different scenarios:
Present Day vs Future or Seasonal Differences
Changing connectivity

- Edit PlusFlow.dbf
- Send flow to top or bottom of receiving flowline
- No change to catchment or flowline geometry
### NHDPlusV2 Diversions & Returns

#### Point Event Representation

<table>
<thead>
<tr>
<th>Reachcode</th>
<th>Measure</th>
<th>Source FeatureID</th>
<th>EventType</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>50.5</td>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>3</td>
<td>23.2</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>67.2</td>
<td>D</td>
<td>R</td>
</tr>
<tr>
<td>7</td>
<td>18.0</td>
<td>E</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>78.6</td>
<td>F</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>40.5</td>
<td>G</td>
<td>A</td>
</tr>
</tbody>
</table>

**PlusARPPointFEvent**
NHDPlusV2 Diversions & Returns
Point Event Representation

PlusARPPointEvent

• Standard NHD Point Event Table
• Transferable to/from NHD High Res.
## NHDPlusV2 Diversions & Returns

### Point Event Representation

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Quantity</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>2</td>
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<td>350</td>
<td>cfs</td>
</tr>
<tr>
<td>A</td>
<td>F</td>
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<td>cfs</td>
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<tr>
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<td>E</td>
<td>30</td>
<td>cfs</td>
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<tr>
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<tr>
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<td>520</td>
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<tr>
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<td>132</td>
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</tr>
</tbody>
</table>

PlusFlowAR
NHDPlusV2 Diversions & Returns
Point Event Representation

PlusFlowAR

- A non-geometric routing of flow
- From an NHDFlowline to a Removal Point
- From a Removal Point to an Addition Point
- From a Removal Point to Consumptive Use
- From an Addition to an NHDFlowline
- Flow Quantity
- Different versions of table for different scenarios
Review: NHDPlus Scenarios

No changes to geometry, only attributes
Four tables users can tweak:
- DivFracMP.dbf
- PlusFlow.dbf
- PlusARPointEvent.dbf
- PlusFlowAR.dbf

ReRun VAA’s
NHDPlus Scenarios (cont.)

- This will change:
  - CumulativeArea.dbf
  - elevslope.dbf
  - PlusFlowlineVAA.dbf

- Suggestion: Keep separate NHDPlusAttributes folders for each scenario