# **Setting up the Local and Global Geodatabases**

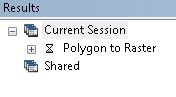
(This exercise is run on data created in the HydroDEM exercise)

# **Create the Global Geodatabase**

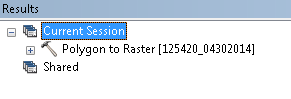
1. In ArcCatalog, create a new File Geodatabase, called global.gdb, in the archydro folder (folder containing the HUC workspaces).
2. Right click on the new global file geodatabase and select the New > Feature Dataset
   1. Give it the name ‘Layers’.
   2. In the next menu, choose the coordinate system by IMPORTING from one of the dems.
   3. Default the next menu (vertical coordinate system) to none and default the last menu (tolerance settings).
3. Now we will start creating the layers for the global geodatabase.

Create the global hucpoly feature class

* 1. Open a new ArcMap.mxd and save as ‘makeglobal.mxd’ in the upper level workspace. Add the source\_data.gdb 🡪‘huc8index’ feature class, which can be found in the inputdata geodatabase. (This is the projected version of the WBD hucs). Generally, you will use the projected WBD used in the DB setup step.
  2. Add designated snap grid dem. Snapping to consistent origin coordinates is a critical element to building nearly all of your ArcHydro raster datasets.
  3. In ArcToolbox, find the Conversion Tools toolbox. Under “To Raster”, start the **Polygon to Raster** tool. If using ArcGIS10.0, be sure to uncheck “background processing” in the Geoprocessing options.
  4. Select huc8index from the layers pulldown for the Input Features
  5. Select HUC\_8 for the Value Field.
  6. For the output raster (temp raster), so you can use the default location.
  7. Let the other parameters default, except set the Cell Size to 10.
  8. **IMPORTANT**: Before clicking OK, **click Environments.**
  9. Expand the Output Coordinates. Set Output Coordinates to “Same as layer huc8index”.
  10. Expand Processing Extent; Set Extent to “Same as layer huc8index”. Select the dem layer as the Snap Raster. (If you don’t do this, the output grid cells will not align properly.)
  11. Open Properties of the output raster, and verify that the extent coordinates are even multiples of 15, like all our other grids.
  12. Click OK to create raster. The tool can a few minutes to do the conversion. You can check the Geoprocessing 🡪 Results 🡪 Current session. The tool is still running, if you see:



….and done when it looks like:



4. In ArcToolbox, find the Conversion Tools toolbox. Under “From Raster” start the “**Raster to Polygon**” tool.

a. Choose the raster you made above as the Input raster.

b. Choose HUC\_8 as the field

c. Set the output polygons to go into the global.gdb geodatabase we created earlier, under the “Layers” feature dataset, and named “hucpoly”.

d. Uncheck the Simplify polygons checkbox. Click OK.

e. Symbolize the hucpoly features with a hollow symbol and some colored outline. Zoom in and compare it to the original huc8index, and to some of the grids in the local workspace. It should align perfectly with the grids, but will be a jagged, raster-like representation of the WBD.

1. Now let’s create the global ‘streams’ feature class
   1. Add the 01091111/fdr and 01091111/str grids. Turn off the fdr grid.
   2. Zoom into the outlet area of 01091111.
   3. Select the flowpath tracing tool from the ArcHydro toolbar
   4. In the menu that pops up, specify the 01091111/fdr grid
   5. Click on a cell anywhere upstream along the 01091111/str grid (I typically select a cell at least 20 cells upstream)
   6. **In Xtools Pro,** go to Feature Conversions > Convert Graphics to Shapes –or- **Draw Menu** 🡪 Drawing🡪 Convert Graphics to Feature (line graphics, fdr coords)

i. XTools dialog – Switch graphic type to polyline

ii. Output Storage > Save as Type “File and Personal Geodatabase Feature Class”

iii. save in global,gdb🡪 Layers🡪strm\_1111

iv. Once back in the main menu, uncheck ‘Add ID Field’ and ‘Add Texfield’.

v. Click ok.

Draw menu dialog – Convert Line Graphics

Coordinate system to use - fdr

Output featureclass – global.gdb 🡪 Layers🡪 strm\_1111

* 1. Select the graphics and delete
  2. Remove the str and fdr grids from the legend
  3. Repeat the above steps for other headwater hucs in the Watershed (2222 & 3333). Name the outputs in a similar way. **\*\* Note: Most States will have border hucs that flow out of the State and have no upstream hucs flowing into them. These do not need to be ‘networked’ with a global ‘streams’ feature class**
  4. For 4444, (downstream receiving huc) repeat the Flow Path Tracing above steps, but run the process at the inlet cell for each upstream Hucs. (Find the inlet cell by adding the strxxxx featureclasses from Global.gdb 🡪 Layers.) If there are multiple inputs to one downstream huc, run all Flow Path Tracing graphics before converting to polylines. Name the output ‘strm\_4444’ (for the downstream receiving HUC, we need to trace flowpath downstream from ALL inlets. This will give us single mainstem paths from inlet to outlet).

2. Combine all the parts of streams in the downstream receiving HUC into one.

i. Start Editing with the global personal geodatabase as your target

ii. Set selectable layers to ‘strm\_4444’.

iii. Select all stream lines in strm\_4444 with the edit tool

iv. Load the Topology Toolbar (if not already loaded) into your ArcMap session.

On the Advanced Editing, click the “Planarize Lines” tool to remove all the overlaps and to create nodes at the junctions. Accept the default cluster tolerance and Click ok.

Save Edits

Use the ArcToolBox Merge tool (under Data Management Tools > General) to compile the 4 feature classes into 1. Name the output ‘streams\_tmp’ [put it in the global.gdb🡪layers]

The Streams segments need to be connected with small single-cell length lines at the inlet/outlet locations

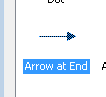
i. Start Editing with the global personal geodatabase as your target

ii. Set selectable layers to ‘streams\_tmp’

iii. Zoom into the outlet of 1111. Starting at the upstream end, add a line connecting the end node outlet of 1111 with the end node inlet of 4444.

iv. Repeat for 2222 and 3333 inlets.

Symbolize the streams\_tmp layer with “arrow at end” to see if the stream lines are pointing downstream.



i. You may notice several arcs pointing upstream. These need to be flipped.

ii. Search 🡪 tools> Flip line (editing); input features streams\_tmp

Arrows should now point upstream

Save edits. Quit the Editor session.

Create nodes at each location where the streams\_tmp feature class intersects the hucpoly feature class:

i. In Toolbox > Analysis Tools > Overlay, select the Intersect tool

ii. Input: streams\_tmp, hucpoly

iii. Output: streams

iv. Join attributes ALL, Output LINE

Save and close ArcMap

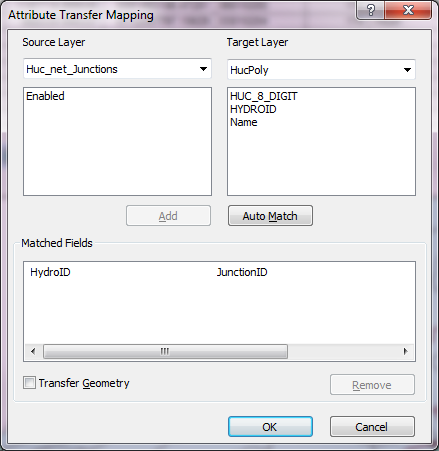
3. Create the global geometric network

* 1. Open ArcCatalog
  2. Right click on the layers feature dataset. Choose New Geometric Network
  3. Click Next
  4. Name the geometric network “huc\_net”
  5. Say YES to snap features and accept defaults
  6. Select ‘streams’ as the feature class you want to build your network from.
  7. click next 3 times to accept defaults
  8. Finish
  9. Close ArcCat

1. Open makeglobal.mxd. Remove all layers from the legend. Add the Global.gdb 🡪 Layers 🡪 huc\_net and hucpoly feature. Save the map

2b. Add HydroID field (long int) to huc\_net\_Junctions

1. From the ArcHydro Attribute Tools pulldown menu, choose ‘Assign Hydro ID’ and select all feature classes in the layers feature dataset. Click ok
2. From the ArcHydro Network Tools pulldown menu, choose ‘Set Flow Direction’. Select the streams layer and With Digitized Direction. Click ok.
3. Add a long integer field, JunctionID, to the hucpoly feature class. Also add a 10 digit character item and call it Name
4. Start editing.
5. Populate the name field for each huc; use attribute Field Calculator and HUC\_8 field.
6. Turn on the Spatial Adjustment toolbar.
7. On the Spatial Adjustment pulldown, select Attribute Transfer Mapping
   1. For Source Layer select huc\_net\_junctions and hydroID from the fields
   2. For Target Layer select hucpoly and double click JunctionID from the fields (double clicking matches the fields)
   3. Click ok.



1. Zoom in so you can see the junction where the stream intersects the border of two hucs. On the right end of the Spatial Adjustment Toolbar, select the Attribute Transfer Tool. Left click first on the junction then left click anywhere inside the upstream hucpoly. Repeat this for all the other hucs. Open hucpoly to see that all hucpoly features now have a JunctionID and Name. Don’t assign Junction ID for the most downstream huc.
2. Save and Stop editing. Save makeglobal.mxd. quit ArcMap
3. In ArcCatalog: make a relationship class:
   1. Right click the global geodatabase and select “New > Relationship Class”
   2. Name the relationship class “HUCHasJunction

i. Origin Table is hucpoly

ii. Destination Table is huc\_net\_Junctions

iii. Make it a simple relationship

* 1. Specify a label

i. From the origin table/feature class t destination: huc\_net\_junctions

ii. From the destination table/feature class to origin: hucpoly

iii. Enter ‘none’ for message direction

* 1. Select one to one cardinality
  2. Do not add attributes
  3. Primary Key: JunctionID
  4. Foreign Key: HydroID
  5. Next ; finish

1. Re-open the makeglobal mxd.

1.Test the global tool using the Global Delineation tools (Globe Icon on the toolbar)

2. Specify GlobalDatapath to archydro folder

3. click anywhere on the mainstem on the streams featureclass.

4. Snapping Yes, distance of 6 cells.

5. Watershed should display and a menu asking “Do you want to save the watershed?”

Yes, then name it and it will be saved in the GlobalWatershed feture class.