Lake Connectivity Classification Tool

Purpose:

This tool is designed to take a NHD file geodatabase for a subregion and classify lakes by the type of connectivity they have to other surficial hydrological features in the landscape.

Processing is limited to those features that are:

1. Digitized in the 24k NHD
2. Lakes, ponds, and reservoirs >= 1 hectare in areal size

The tool classifies the lakes into four categories:

1. SE = Seepage (isolated) lakes. These lakes don't intersect any streams.
2. HW = Headwater lakes. These lakes have only an outlet stream and are at the furthest upstream end-points of the geometric network.
3. ST = Stream drainage lakes. This group has a stream inlet but no connected, upstream lakes >= 10 hectares.
4. STLA = These lakes are connected to the geometric network via streams and do have a lake that is connected, upstream and greater than 10 ha in area.

This tool was designed to be used with ArcGIS 10.1.

Known Issues:

- In lakes that have broken/dangling artificial flowlines (generally due to digitizing error) it is common to get a HW classification that may or may not be accurate.
- The results are subject to the quality and resolution of the input NHD 24k data. This is a possible source of erroneous classification. For instance, if a lake's inlets or outlets are absent from the NHDFlowline feature class, it would be classified as SE or isolated, but might not be isolated in reality.
- Lines in the NHD that have flow that is "indeterminate" (lacking direction) may be misclassified.
- Lakes that "feed themselves" having an outlet that later becomes an inlet on another part of the lake, have a chance of being misclassified.
- Generally, lakes with many outlets/inlets and lakes with very complex geometry have the greatest risk of misclassification due to inaccurate digitization within the geometric network.
- I encountered a couple NHD datasets downloads that were faulty, but still produced some results. It is good practice to make sure you have all four categories in your output. If not, try using the 9.2 version of the geodatabase instead of the 9.3 version. Only 2 of 70 datasets we ran had this problem and in both cases it was resolved by using 9.2 formatted databases.

Installation:

Now that you have the tool's zip extracted wherever you want it…

1. Open arcmap or catalog (10.1)
2. Open arctoolbox
3. Right click the top level toolbox "ArcToolbox"
4. Add toolbox
5. Navigate to the folder where you extracted the tool and select the CSI Tools toolbox.
6. After a few seconds the toolbox should appear in the arctoolbox window.

Alternatively, you can try to run the python script outside of arcgis by replacing the "GetParameterAs Text" parameters with the paths to your data in the form ***r'C:\some\path\to\data'.***

Contact info:

This tool was scripted by me, Scott Stopyak for Michigan State University. The python code is subject to GNU General Public License Version 3, 29 June 2007.

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