

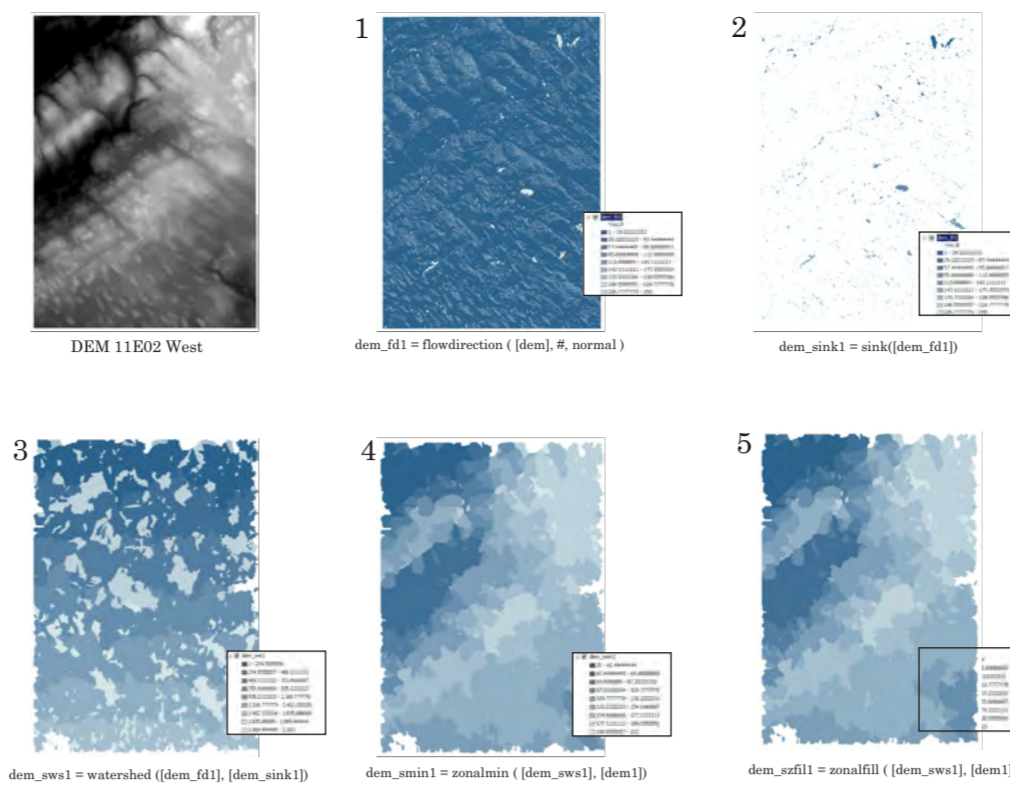
Watersheds of 11E02 West

This exercise predominantly deals with the manipulation of DEM's and streams to create watersheds of a particular area. Through many commands and specific requirements, accurate watersheds can be achieved. The exercise delves into several different methods, each enabling the creation of a watershed; though some are more handy and risk proof than others.

The entire process covers the creation of a depressionless DEM by the identification and filling of sinks, the identifying and ranking of streams, the assembly of points and finally the output of a watershed.

Compiled by Lucy Hughes

Produced as a portion of GEOM 2022. This is a student exercise and as such remains unedited and unverified. It exists for representation purposes only



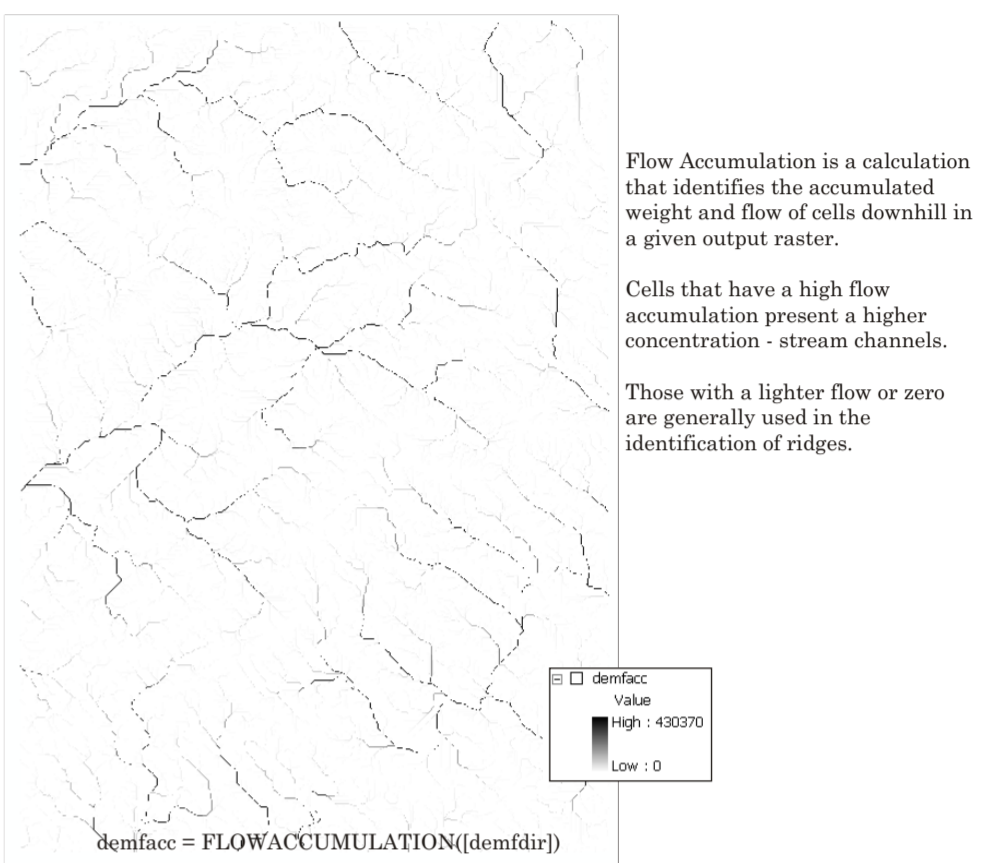
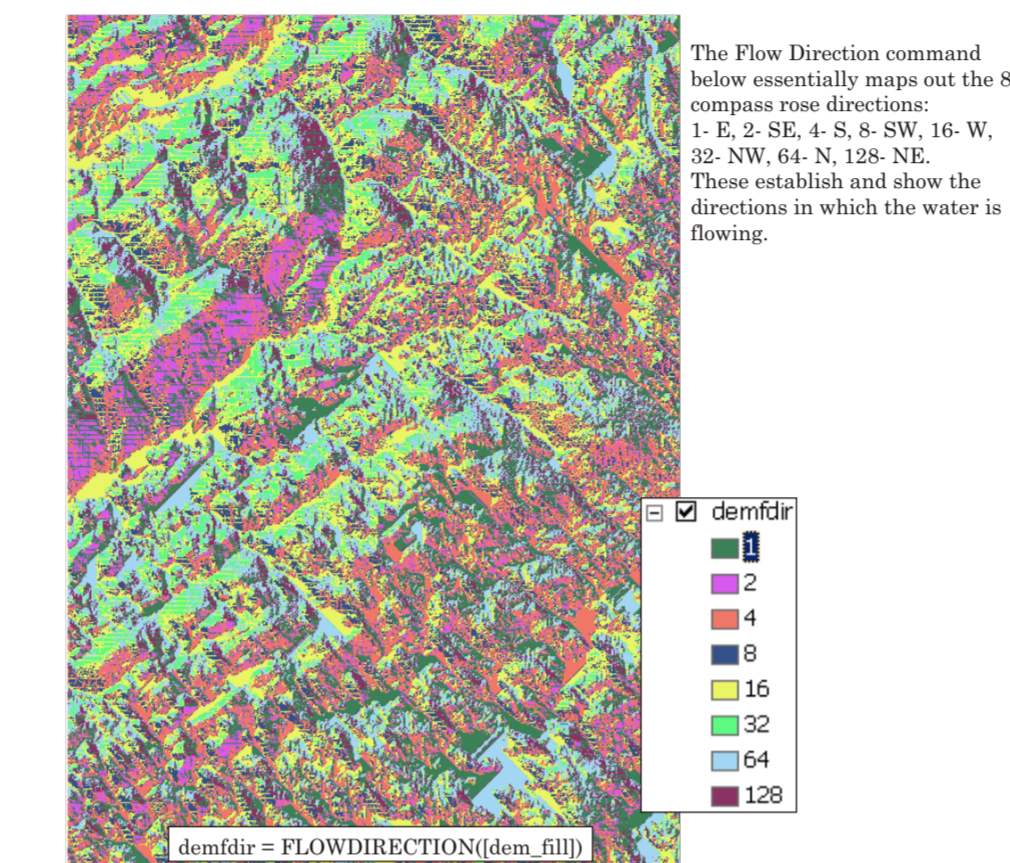
In order to begin the proper analysis of a watershed, the DEM being used must first be checked for sinks. These sinks can be naturally occurring features in terrain, but can also exist due to flaws in the DEM itself. These sinks are filled prior to carrying out commands such as flow direction as not doing so could lead to improper results. The following commands are those that isolate sinks and prepare a depressionless DEM.

- 1 - shows the flow direction of each cell
- 2 - locates and determines sinks
- 3 - identifies the contributing area above a set of cells in a raster
- 4 - this defines sink depth
- 5 - a fill function that fills zones with minimum value along zone boundaries
- 6 - the subtraction of the minimum value from the maximum value to produce sink depth
- 7 - adds depths to original DEM

This resulting filled DEM is created through the use of the Hydrology Tool. It is a very useful mechanism that renders quickly. In the Hydrology pull down there is a Fill Sinks option. The DEM in used as input <fill all> invoked and the output saved.

A hillshade can then be created, using the filled DEM.

Hillshade = hillshade([DEM], 315, 45)

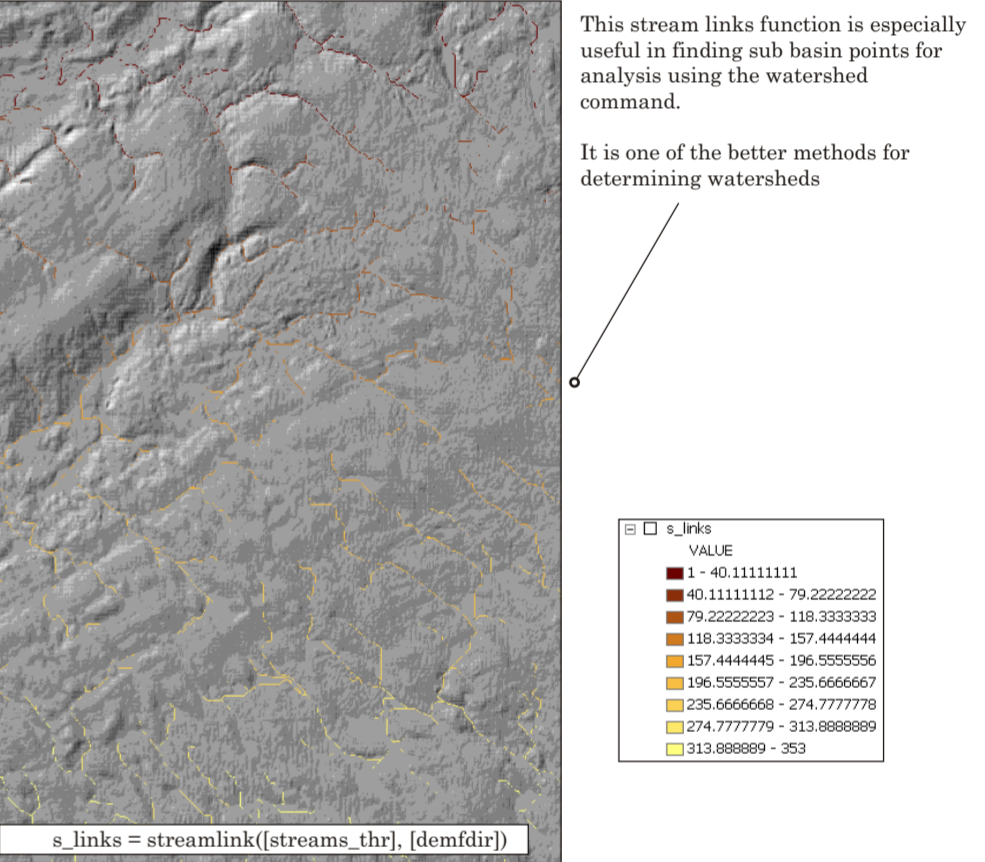
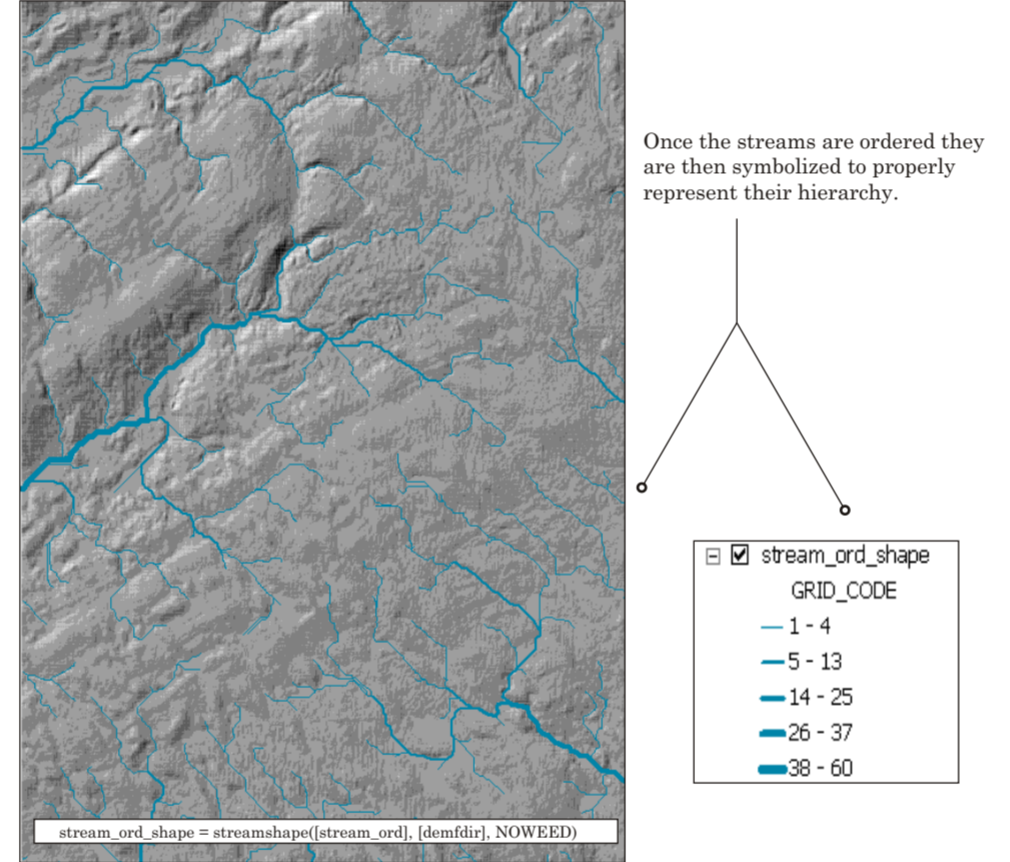


These streams have been vetted down to those whose flow accumulation is greater than 2000. This means that the concentration must be great enough to warrant it being a proper stream.

streams_thr = CON([demfacc] gt 2000, 1)

Following the identification of streams this function separates them into order of magnitude.

stream_ord = streamorder([streams_thr], [demfdir], SHREVE)



By use of Regiongroup and con(isnull) functions the streams are able to be given a unique id based on aggregated connectivity.

streams_id = regiongroup(con([s_links] >= 0, 1), #, EIGHT)

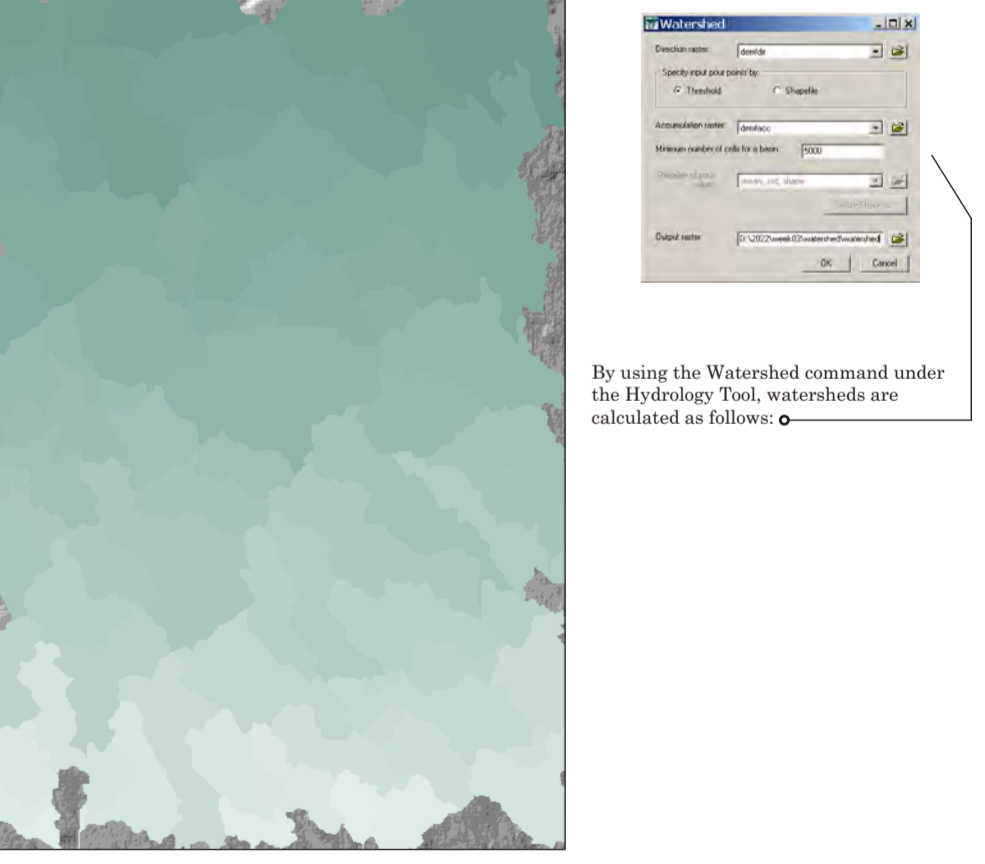
Now that the streams are properly assigned, ordered and ranked, a new shape file is created in order to create points. These points are placed at the beginning areas of the largest streams.

The point shape file is then converted to raster by way of Spatial Analyst - using the ET_ID field and a cell size of 40.

The resulting gridpoints are used to then determine the watersheds they pinpointed.

wshed_0 = WATERSHED([demfdir], [gridpoints])

The watershed calculated using gridpoints.



The basin function, above details another method of deriving watersheds.

basin = basin([demfdir])

The area of the drainage basin is calculated by selecting all those values that are higher than 5000. While they are still selected the newbasin function is run to produce the output below.

newbasin = gridshape([basin], WEED)

