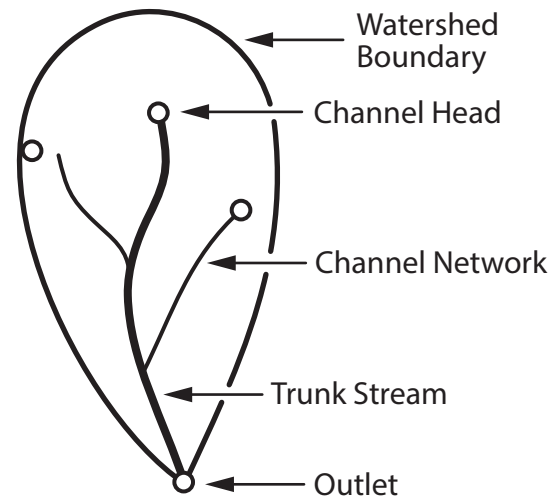


# Delineating Watersheds

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## A.) Parts of a Watershed



Large watersheds are defined by National Hydrography Dataset (nhd.usgs.gov). The boundaries of smaller watersheds are not formalized, thus they must be delineated. Several software programs can do this, but all use the same basic methodology.

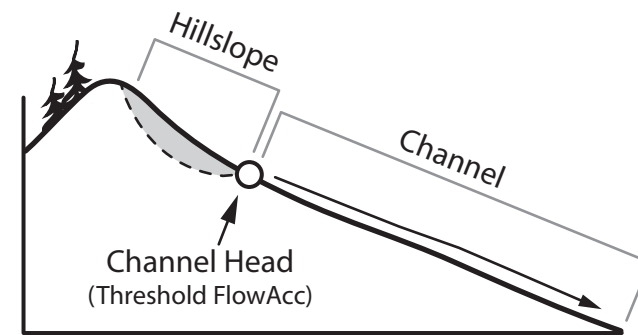
Watershed delineation depends on several factors that the user must be aware of:

- DEM Resolution (1m vs. 30m vs. 90m)
- Flow Direction algorithm (D8 vs. D-infinity)
- Channel Initiation Threshold Value you choose

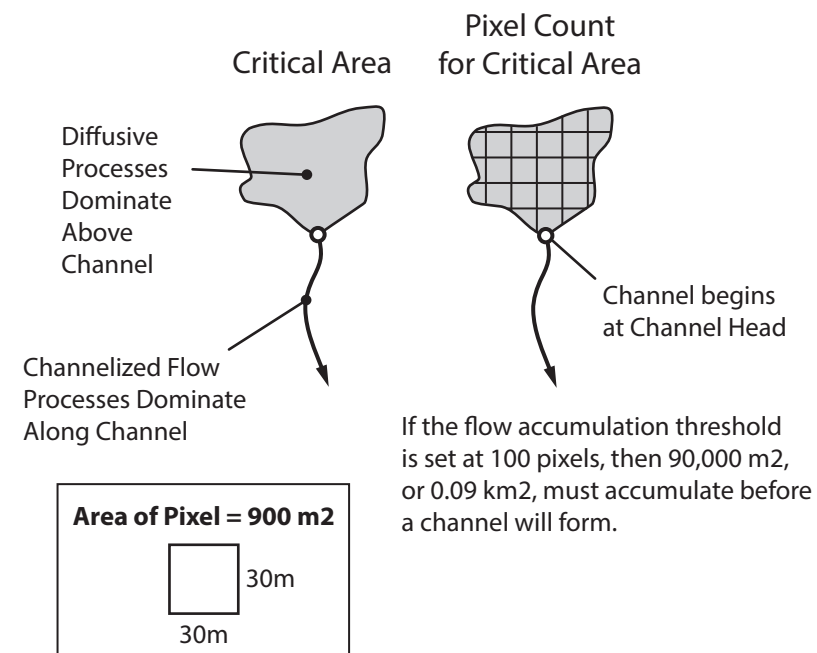
Watersheds and their stream networks are created together. The location and complexity of DEM-delineated stream networks will typically differ from USGS/NHD blue lines or streamlines interpreted from aerial photos.

A helpful review the 7 methods for channel network delineation is provided by Heine et al. (2004). The "expert-defined constant flow accumulation" method is shown here.

## B.) Channels Begin Where Threshold FlowAcc is Reached



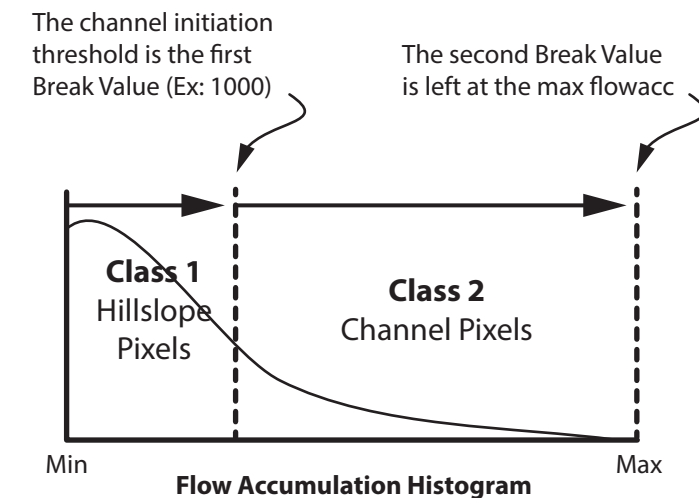
## C.) Geomorphic Process Changes at the Channel Head



If the flow accumulation threshold is set at 100 pixels, then 90,000 m<sup>2</sup>, or 0.09 km<sup>2</sup>, must accumulate before a channel will form.

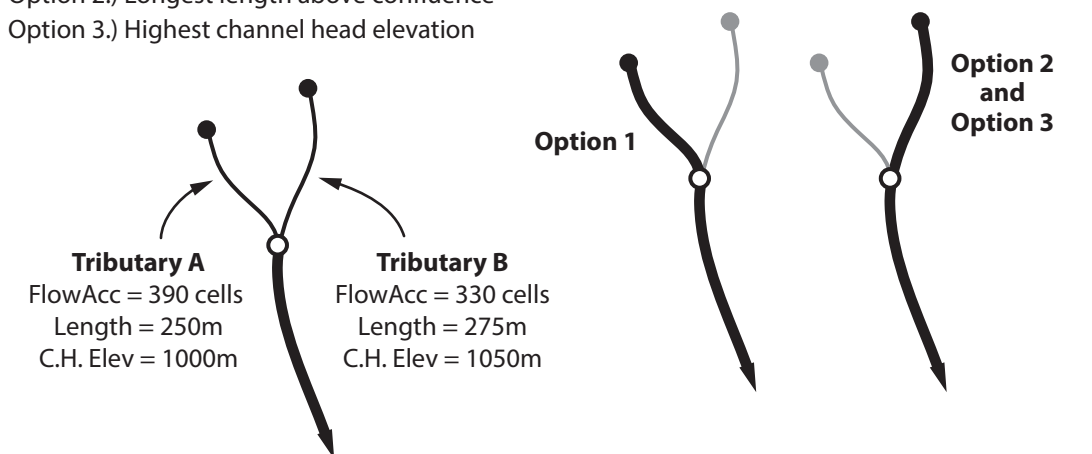
## D.) Reclassifying FlowAcc Raster: Channels & Non-channels

Class	Break Value	Old Values	New Values	Interpretation
1	1000	0-1000	NoData	Hillslope Pixels
2	max	1000-max	1	Channel Pixels



## E.) Choosing the Trunk Stream - which tributary?

- Largest flow accumulation to confluence
- Longest length above confluence
- Highest channel head elevation



## Watershed Delineation Workflow in ArcGIS

Acquire DEM > Set CoordSys > Fill DEM > FlowDir > FlowAcc > Reclass FlowAcc > Create Outlet > Convert to Pixel > Watershed > Convert to Polygon