Morphometric Parameter	Formula	3D Area formulations notes	Variables	Source Reference
Hypsometric Integral	HI = (Hmean - Hmin)/(Hmax - Hmin)	Use Focal Statistics in the Neighborhood toolbox to calculate and iterate over every cell value in an elevation raster. Then use raster calculator to solve equation for the rasters generated from focal statistics. To determine the analysis area one should build a semivariogram of the raster to determine the rate of change over the area to find the inflection point where the rate of change is no longer increasing rapidly as the area of analysis increases.	Hmax=Max Elevation, Hmin=Minimum Evaluation, Hmean=Average Elevation	Pike and Wilson 1971
Relative Relief	Rr = Hmax - Hmin	Use Focal Statistics in the Neighborhood toolbox to calculate and iterate over every cell value in an elevation raster.	Hmax=Max Elevation, Hmin=Minimum Evaluation	Strahler 1952
Dissection Index	DI = Rr/Hmax	Use Focal Statistics in the Neighborhood toolbox to calculate and iterate over every cell value in an elevation raster. Then use raster calculator to solve equation for the two rasters (Rr.tif/Hmax.tif)	Rr=Relative Relief, Hmax=Maximum Elevation	Nir 1957
Slope	1st derivative of elevation surface	Slope tool in Spatial Analysis/Surface toolbox		
Curvature	2nd derivative of elevations surface	Surface Parameters tool in Spatial Analysis/Surface toolbox		
Drainage Density	Dd = Lu/Wa	In GIS this is completed by generating a raster. This is done by determining the Stream Order (Strahler or Sheve) per unit study area again by using the semivariogram of the elevation area. Make a grid, then count the stream order for each grid. Convert the grid to a point dataset with the grid code being the count of the stream order. Then interpolate the stream order per unit area.	Lu=Length of all the streams in the basin, Wa=Area of basin	Horton 1945
Stream Frequency	Sf = Nu/Wa	In GIS this is completed by generating a raster. This is done by determining the streams per unit study area again by using the semivariogram of the elevation area. Make a grid, then count the streams for each grid. Convert the grid to a point dataset with the grid code being the count of the streams Then interpolate the stream count per unit area.	Nu=Total Number of Streams, Wa=Area of basin	Horton 1945
Stream Power Index	SPI = ln(As * Tan(Θ)	Raster Calculator Formula SPI = Ln("AccumulationRaster.tif" *(Tan("SlopeRaster.tif"*(π/180))))	As=Specific Catchment area, Θ=Slope in Radians, AccumulationRaster.tif=Accumulation derived from Spatial Analysis/Hydrology/Accumulation, Slope.tif=Slope derived from Spatial Analysis/Surface/Slope	Moore et al. 1991