Name: _____

Stream Patterns

Introduction

Stream patterns and stream characteristics provide valuable information to geomorphologists. The stream pattern of a particular watershed is influenced by lithologic, substrate, and structural controls. Currently, the most commonly used stream ordering technique is the Strahler classification system. In this system, headwater streams with no tributaries are designated as an order 1 stream. When streams of the same order combine, the magnitude of the stream increases. Many drainage basin attributes have a predictable relationship with stream order.

Overview

A. Study the Mount Katahdin, ME Quadrangle

1. Map Scale: _____
2. Contour Interval: _____

B. Using a piece of tracing paper, determine the boundary of the Wassataquoik stream watershed. Use BM 1308 located approximately 6 miles north of Mount Katahdin as your outlet. The watershed boundary is the drainage divide (high ridge separating water flow to different basins). Delineation of watershed boundaries takes practice! It may be helpful to start by placing X's on the areas of high ground in the surrounding area. It is also helpful to examine the direction of water flow in the area. Using pencil, trace the patterns of all of the streams within the drainage net onto tracing paper.

1. Using the dot grid provided, determine the area of the watershed in square miles and acres.

2. Describe the drainage pattern for the watershed.

C. Determine the Strahler stream order for each of the streams within the drainage net. Color each stream segment by stream order. Be sure to provide a legend.

1. Calculate the gradient (ft mi^{-1}) of Wassataquoik stream (4^{th} order stream segment).

2. Determine the number of streams within each stream order. In addition, measure the total length stream segments by stream order.

Order	Number of Streams (#)	Total Stream Length (miles)	Mean Stream Length (miles)
1			
2			
3			
4			

3. Calculate the drainage density of the Wassataquoik stream watershed.

D. Using Excel, plot the number of streams versus stream order on an arithmetic scale.
E. Using Excel, plot the number of streams versus stream order on a semi-log scale. Determine the line of best-fit for the data.

F. What is the y-intercept and slope for your semi-log best fit line?

G. Calculate the bifurcation ratio (R_b).

H. How does the bifurcation ratio compare with the average value of 3.6 for the United States?

I. Calculate the stream basin order (S) from your semi-log plot of number of streams versus stream order.

J. How does the calculated basin order compare with the actual value you determined from your drainage net?

K. Re-write the Law of Stream Numbers and substitute the values you obtained for R_b and S and predict the number of 1st, 2nd, 3rd, etc. order streams for the basin. Include your actual values from your drainage net as reference (above table).

Order	Predicted	Actual
1		
2		
3		
4		

L. Does this watershed conform to the Law of Stream Numbers?

M. Using Excel, plot the mean stream length stream versus stream order on a semi-log scale.

N. Compare and contrast the plots of stream numbers and the mean stream length versus order.

O. Discuss at least 3 possible sources of error or discrepancy in this exercise.