Pebble Count

Overview

The composition of the streambed and banks is an important facet of stream character. It influences channel form and hydraulics, erosion rates, sediment supply and other parameters. Each permanent reference site should include a basic characterization of bed and bank material.

The composition of the streambed (substrate) influences how streams behave. Steep mountain streams with beds of boulders and cobbles act differently than low-gradient streams with beds of sand or silt. This difference may be documented by a quantitative description of the bed material called a pebble count.

Pebble count consists of 3 parts: The first requires collecting samples a total of 100 pebbles from cross sections throughout the longitudinal reach of the stream. This count is used for stream classification. The second samples 100 pebbles at a single cross section. This is for cross-section analysis. The third also samples 100 pebbles at a riffle, but includes only the pebbles from the wetted perimeter (anywhere the water is in contact with the channel bed) at normal flow. This count is used to calculate entrainment and velocity. The third part will be undertaken in this workshop.

(Source: *Doll, B.A., G.L. Grabow, K.R. Hall, J. Halley, W.A. Harman, G.D. Jennings and D.E. Wise, 2003. Stream Restoration: A Natural Channel Design Handbook. NC Stream Restoration Institute, NC State University. 128 pp.*)

Pebble Count Instructions

Step 1. Collect 100 pebbles from a riffle cross section, zigzagging from the left water's edge to the right water's edge at normal flow.

Step 2. Measure the intermediate axis of each particle collected (Figure 1). Measure embedded particles or those too large to be moved in place by using the smaller of the two exposed axes. Call out measurements for the note-taker to tally by size class. Sample pebble count data sheets are in Table 1.
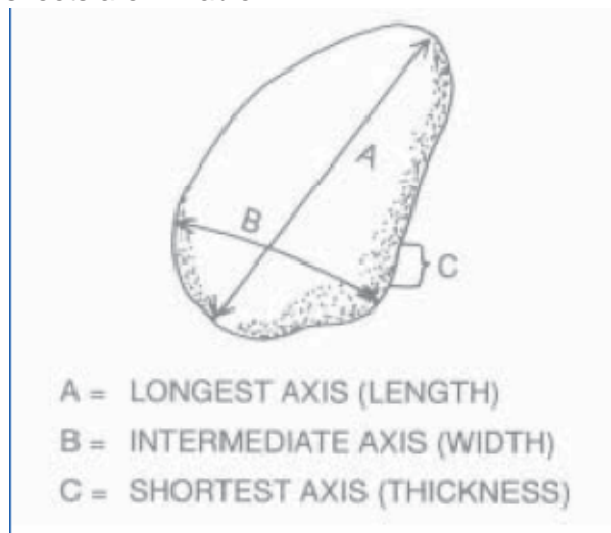

A = LONGEST AXIS (LENGTH)
B = INTERMEDIATE AXIS (WIDTH)
C = SHORTEST AXIS (THICKNESS)

Figure 1. Axes of pebble.

Step 3. Take a step forward and collect a pebble moving across the channel in a direction perpendicular to the flow. Repeat the process, continuing to pick up particles until the requisite number of measurements is taken. The note-taker should keep count. Continue traversing the stream until all areas between the left and right edges of water are representatively sampled.
Step 4. After counts and tallies are complete, plot the data by size-class and frequency. Table 1 is an example of a pebble-count form. A sample pebble count plot is shown in Figure 2.
Step 5. For stream Classification, use the d_{50} value.

For more information refer to : Doll, B.A., G.L. Grabow, K.R. Hall, J. Halley, W.A. Harman, G.D. Jennings and D.E. Wise, 2003. Stream Restoration: A Natural Channel Design Handbook. NC Stream Restoration Institute, NC State University. 128 pp. Also available at:
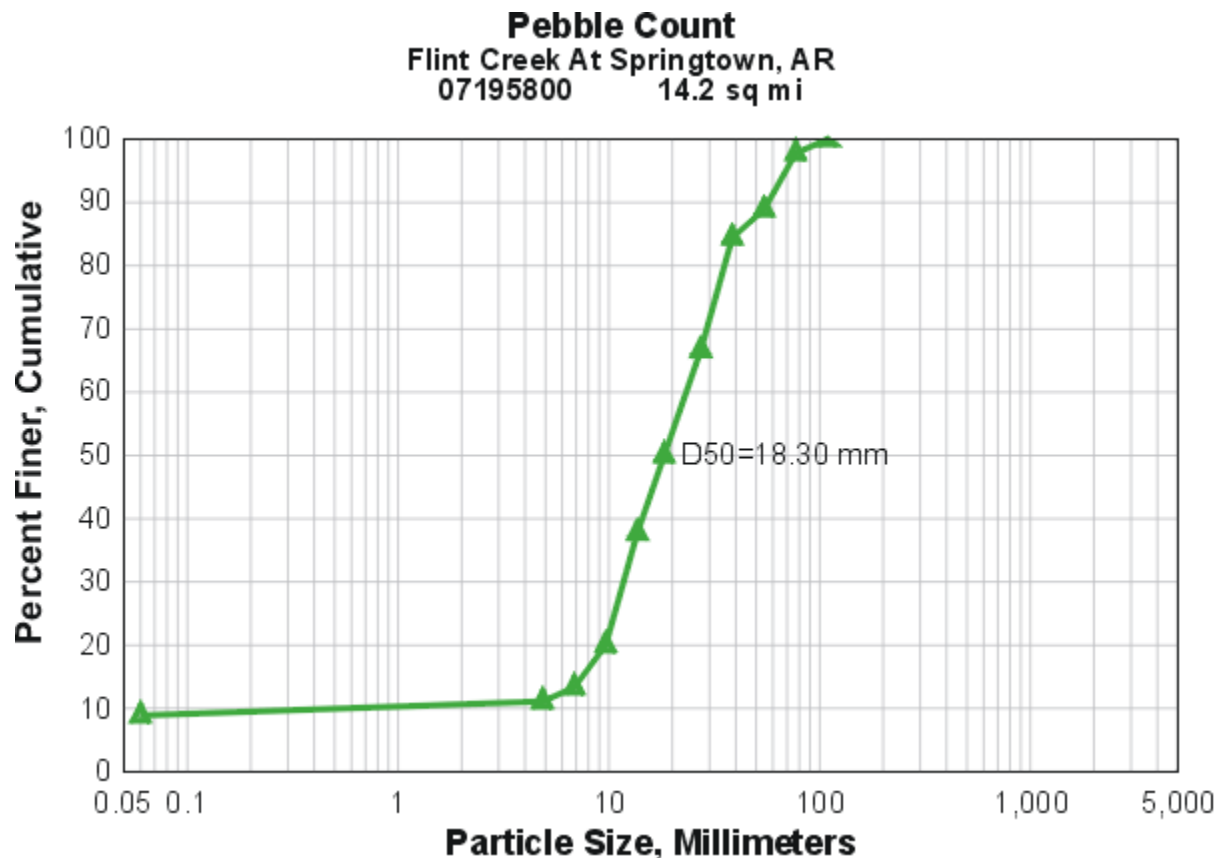
http://www.bae.ncsu.edu/programs/extension/wqg/srp/guidebook.html

Figure 2. Example cumulative pebble count plot.

Stream processes and restoration
Dr. Fouad Jaber

		Pebble Count									Pebble Count			Pebble Count		
Site:			Date:								Date:			Date:		
Party:			Reach:								Reach:			Reach:		
INCHES	PARTICLE	MILLIMETERS			PARTICLE COUNT				TOTAL#	ITEM %	%CUM	TOTAL#	ITEM %	%CUM	TOTAL#	ITEM %	%CUM
	SILT/CLAY	< .062	S/C	1	2	3										
	Very Fine	.062 – .125	S													
	Fine	.125 – .25	A													
	Medium	.25 – .50	N													
	Coarse	.50 – 1.0	D													
.04 – .08	Very Coarse	1.0 – 2	S													
.08 – .16	Very Fine	2 – 4														
.16 – .24	Fine	4 – 6	G													
.24 – .31	Fine	6 – 8	R													
.31 – .47	Medium	8 – 12	A													
.47 – .63	Medium	12 – 16	V													
.63 – .94	Coarse	16 – 24	E													
.94 – 1.26	Coarse	24 – 32	L													
1.26 – 1.9	Very Coarse	32 – 48	S													
1.9 – 2.5	Very Coarse	48 – 64														
2.5 – 3.8	Small	64 – 96	C													
3.8 – 5.0	Small	96 – 128	O													
5.0 – 7.6	Large	128 – 192	B													
7.6 – 10	Large	192 – 256	L													
10 – 15	Small	256 – 384	B													
15 – 20	Small	384 – 512	L													
20 – 40	Medium	512 – 1024	D													
40 – 160	Lrg-Very Lrg	1024 – 4096	R													
	BEDROCK		BDRK													
						TOTALS										