Pebble Counts

Pebble Count Overview

Reach Average Pebble Count Form

Riffle Pebble Count and Largest Particle on Bar Count Form

Pebble Count

The pebble count characterizes the channel and bed material present through a given study reach. A representative reach pebble count is used to determine the stream type (e.g., C3 vs. C4) and an active bed riffle pebble count is used for hydraulic calculations (R/D84) to estimate velocity (on riffle bed) and to calculate sediment competence. It is important to note that there are various other reasons and protocols dealing with pebble counts, for this course we will only focus on the **Representative Reach Pebble Count** and the **Active Bed Riffle Pebble Count.**
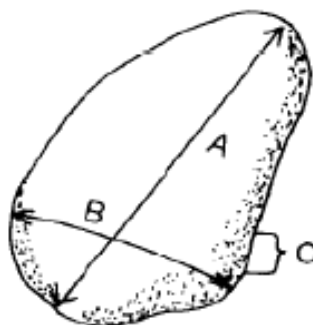
Pebble Count Procedures

To randomly locate transects along a measured reach or selected bed feature, Record the upstream and downstream measurement along the tape that is stretched alongside the stream channel (i.e. 120 to 145 feet; distance equals 25 feet). It is important that the station at 120 feet has same probability of being sampled as the others. Add one foot to distance = 26 feet. Using a calculator's random number generator, obtain random number, multiple by 26, add to 120, and subtract one whole number.

For example, random Number = 0.765 X 26 = 19.89 + 120 =139.89 – 1 = 138.89, the location along the tape to run transect is 138.9 feet.

A transect is then established at the randomly determined station, perpendicular to flow, by stretching a measuring tape across the stream channel. Ten samples are selected equidistance apart. If the transect stretches from up one stream bank to the other, as is the case with the **Representative Reach Pebble Count,** it is important not to "over sample" bank material. To avoid this only one bank sample is taken every other transects. For example, a bank sample is taken at point #1 on transect #1. The next bank sample would be taken at point #1 on transect #3, etc.

Measure the width of the channel and divide by ten for sample spacing. The data collector, working downstream of the tape in order not to disturb the stream bed, randomly selects a sample at the appropriate distance along the tape. This can be done by averting or closing the eyes and reaching down with one finger and collecting the first sample you come in contact with. Some people use a pin flag and select the sample that is touched by the wire end. This is where most of the bias in this technique arises.

The intermediate axis (B-axis) of each particle is measured with a ruler and is generally recorded in millimeters. However, in the case of long, linear-shaped particles, the "intermediate axis" data point is calculated from the average of the A-, B- and C-axes.


(A) Long axis
(B) Intermediate axis
(C) Short axis

The intermediate axis is the pebble's diameter.

Representative Reach Pebble Count

The representative pebble count procedure is a stratified, systematic sample method to proportionally sample all the bed features present within the bankfull channel through a designated reach and is used to determine the stream type. The designated reach is divided into two categories: pools and riffles. The total distance of the reach is divided into total pool length and total riffle length.

For example, assume the total reach length is 1,000 ft . To stratify the sample, collect a minimum of 100 observations proportionally based on bed features. If 300 ft (30%) of the reach is composed of pools and the other 700 ft (70%) is composed of riffles, then 30 particles (or 30%) are measured within pools and 70 particles (or 70%) are measured within riffles. To complete a systematic sample, 10 particles across three different pool cross-sections and10 particles across 7 different riffle cross-sections would be sampled. Riffle data is entered separately from pool data on the **REPRESENTIVE REACH PEBBLE COUNT FORM**.
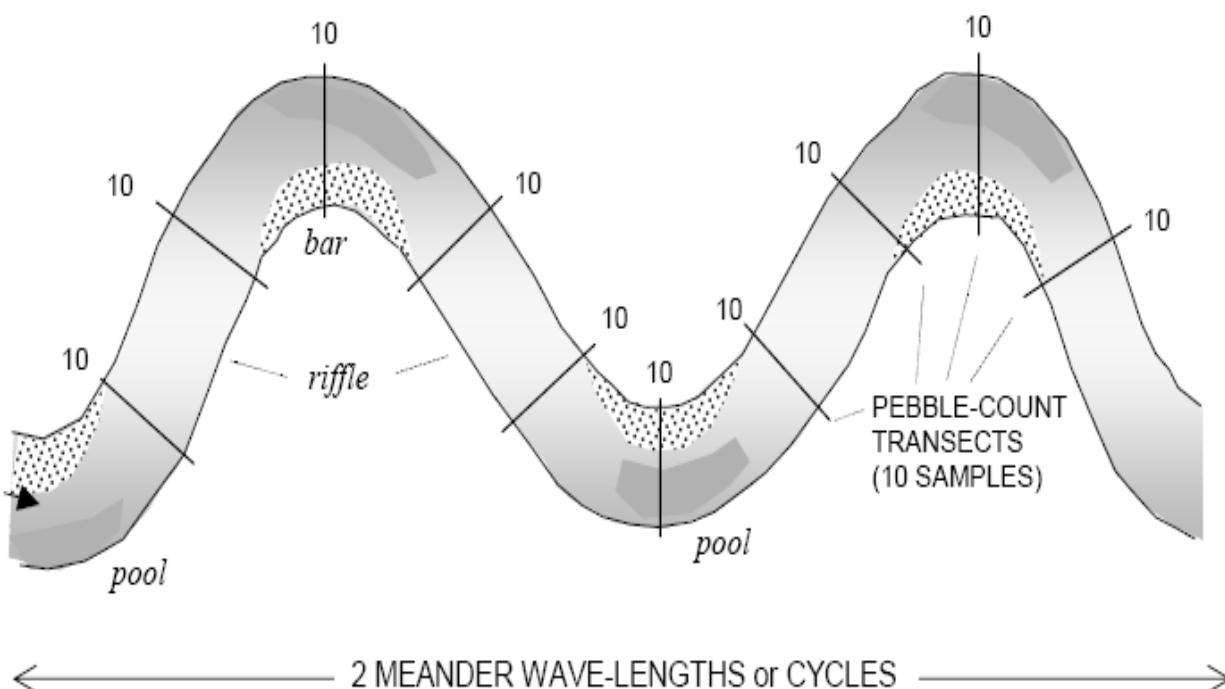
This reach is approximately 24 "channel widths" in length.
Example: Reach configured as: Pool Riffle
75 ft. 175 ft. Total length: ± 250 ft.
Percentage: 30% 70% Samples for Pebble Counts: 30% in Pools; 70% on Riffles.

Particles are collected at evenly spaced intervals across the entire bankfull channel at each of the selected cross-sections. The sampling interval will vary based on the bankfull width.

Remember, to prevent over-sampling bank material, if 10 observations per transect are obtained, generally only one bank sample every other transect is taken. This gives a +/- 5% representative sample. The observer needs to determine the surface area of banks compared to the bed to obtain a proportional bankfull area sample if it is felt this 5% sample does not adequately represent what is observed in the field..

Active Bed Riffle Pebble Count

The active bed riffle pebble count characterizes the bed material only at the surveyed riffle cross-section. One hundred particles are measured at evenly-spaced intervals across the active bed of the surveyed riffle cross-section. If the stream width is small, then more than one transect may be taken to obtain 100 observations as long as the values represent the bed of the surveyed riffle cross-section. The active bed riffle pebble count data is used for hydraulic calculations (R/D84) to estimate velocity and for sediment competence calculations. Record all data on the **RIFFLE PEBBLE COUNT AND LARGEST PARTICLE ON BAR COUNT** form.

ROSGEN REPRESENTATIVE REACH PEBBLE COUNT

STREAM:	DATE:
REACH:	CREW:

PARTICLE TALLY COUNTS BY TRANSECT

ft	PARTICLE	mm		1	2	3	4	5	6	7	8	9	10	Tot Pool	Tot Riff	Comb Tot	%CUM
	Silt/Clay	< .062	S/C														
	Very Fine	.062 - .125	S														
	Fine	.125 - .25	A														
	Medium	.25 - .50	N														
	Coarse	.50 - 1.0	D														
	Vry Coarse	1.0 - 2	S														
	Very Fine	2 - 4															
	Fine	4 - 6	G														
	Fine	6 - 8	R														
	Medium	8 - 12	A														
	Medium	12 - 16	V														
	Coarse	16 - 24	E														
	Coarse	24 - 32	L														
	Vry Coarse	32 - 48	S														
	Vry Coarse	48 - 64															
0.21-0.31	Small	64 - 96	C														
0.31-0.42	Small	96 - 128	O														
0.42-0.63	Large	128 - 192	B														
0.63-0.84	Large	192 - 256	L														
0.84-1.26	Small	256 - 384	B														
1.26-1.68	Small	384 - 512	L														
1.68-3.36	Medium	512 - 1024	D														
3.36-6.72	Lrg	1024 - 2048	R														
6.72-13.43	Vry Lrg	2048-4096															
	Bedrock	>4096	BDRK														
	FEATURE SAMPLED																

	Length	Proportion	No. Units	Sampled		Transect	Feature	Length	Width
REACH						1			
POOL						2			
RIFFLE						3			
RUN						4			
						5			
						6			
						7			
						8			
						9			
						10			

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Modified 4/22/04, TLM

Reach_PC_Form 1

RIFFLE PEBBLE COUNT AND LARGEST PARTICLE ON BAR COUNT

STREAM:				DATE:		
REACH:				CREW:		
XS No.:				Riffle Location (also mark on reach sketch):		

				Particle Count										TOTALS	
ft	PARTICLE	mm		1	2	3	4	5	6	7	8	9	10	Tot #	% Cum
	Silt/Clay	< .062	S/C												
	Very Fine	.062 - .125	S												
	Fine	.125 - .25	A												
	Medium	.25 - .50	N												
	Coarse	.50 - 1.0	D												
	Vry Coarse	1.0 - 2	S												
	Very Fine	2 - 4													
	Fine	4 - 6	G												
	Fine	6 - 8	R												
	Medium	8 - 12	A												
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0.84-1.26	Small	256 - 384	B												
1.26-1.68	Small	384 - 512	L												
1.68-3.36	Medium	512 - 1024	D												
3.36-6.72	Lrg	1024 - 2048	R												
6.72-13.43	Vry Lrg	2048-4096													
	Bedrock	>4096	BDRK												

LARGEST PARTICLES ON BAR

Bar Location (also mark on reach sketch):

Bar Length:		Part. #	mm	Part. #	mm	Part. #	mm
Bar Width (Thalweg - BF):		1		6		11	
Sketch bar profile (Thalweg - BF)		2		7		12	
		3		8		13	
		4		9		14	
		5		10		15	