Measuring Stream Flow and Deposition Along Copeland Creek

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Biology 314

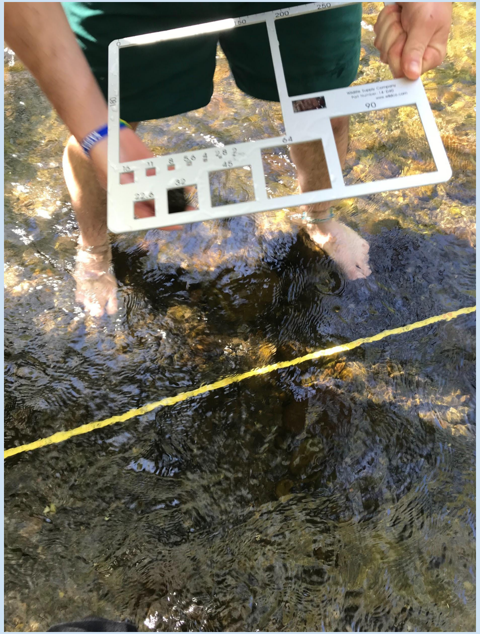
Background

- Flowing water is an important mechanism for both erosion and deposition
- Stream- water velocity is affected by the size of sediment on the stream bed
- As water slows, larger particles are deposited. As the water slows even more, smaller particles are deposited.
- Information on bed-material particle size is important for streambed monitoring, analyzing stream habitat, and being able to predict/understand future stream behavior/processes

Experimental design

- To test whether there is a correlation between streamflow and size of particulates across the stream bed, we set up 5 Transects across a distance of ~1,000m, marking a transect at every 250ft (76.2m) in elevation.

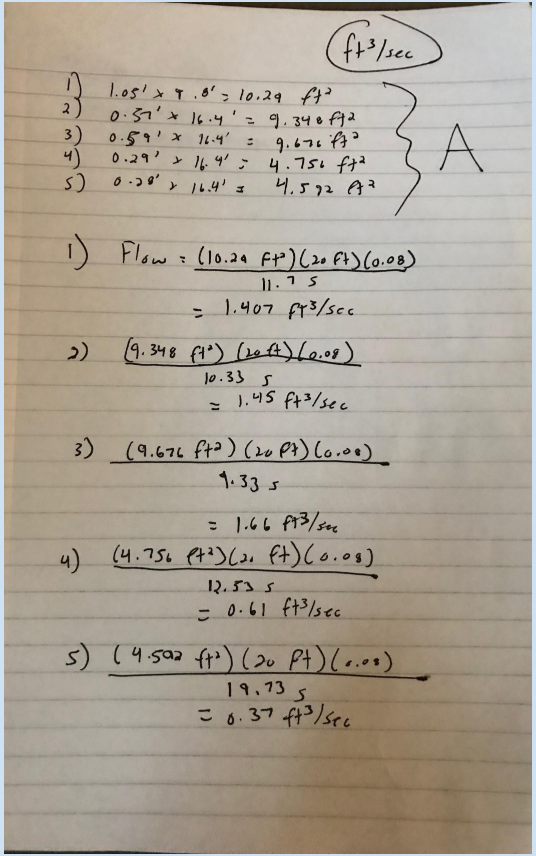
Experimental design/Methods cont.

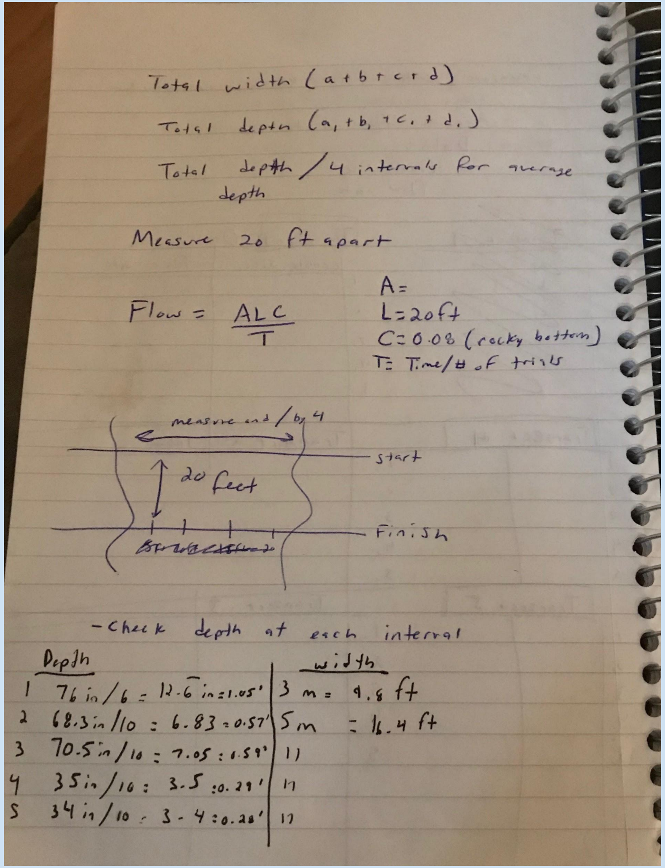


- We measured out from one side of the channel to the other, measuring cobble size at every 0.5 meters
- We also measured water depth at every 0.5 meters
- For flow rate, we used a hollow white ball which we timed floating down the creek 20ft (~6m) from our transect line.
- We used the following formula to calculate flow rate per second:

Total width/Average Total Depth = Ft/s^2

Experimental design/Methods cont.





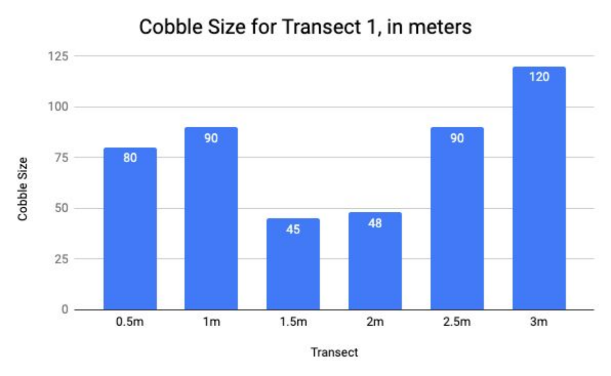
Flow= ALC/T

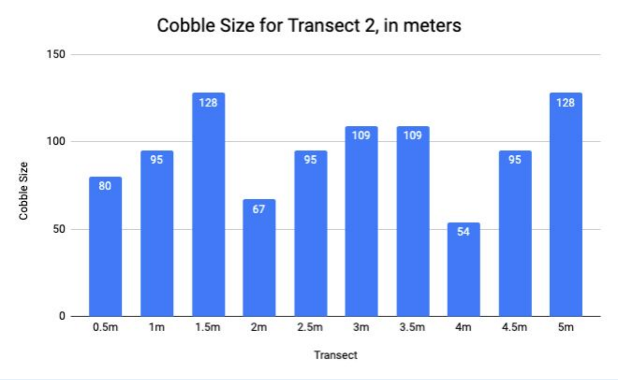
A= average cross sectional area of stream (width x depth)

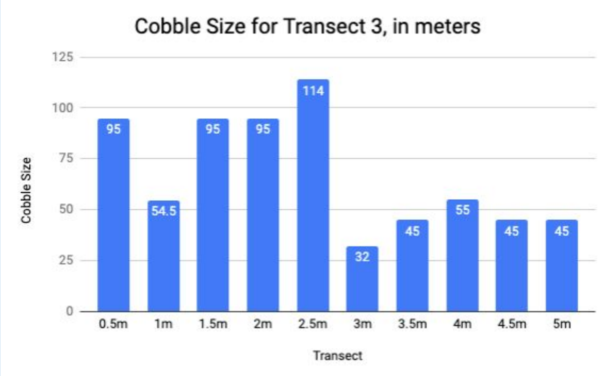
L=length of stream (20 ft)

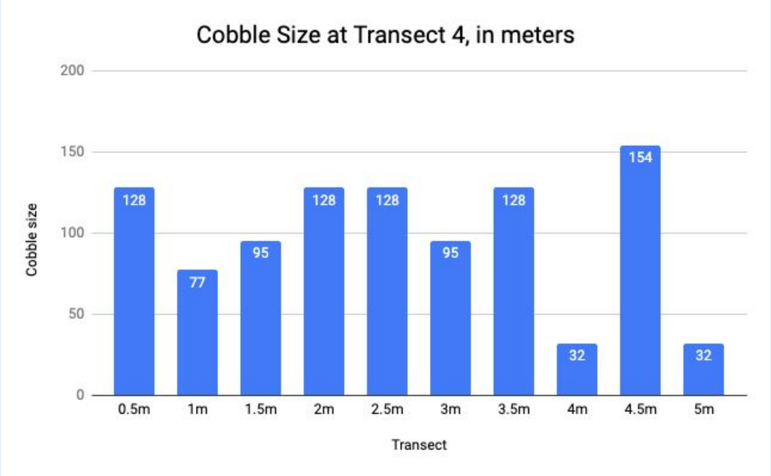
C= coefficient of stream bed (0.08 for rocky bottoms)

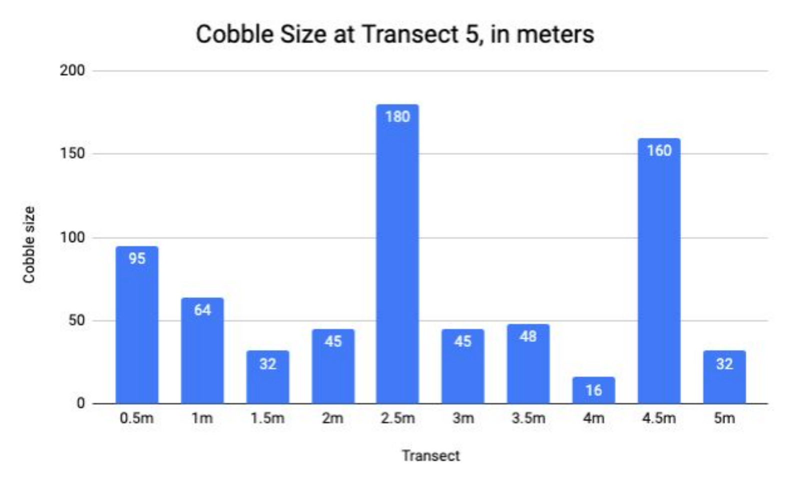
T=Time in s, to travel length of L


Cobble Size for Transect 1, in meters
125
100
75
50
25
0
Cobble Size
80
90
45
48
90
120
0.5m
1m
1.5m
2m
2.5m
3m
Transect

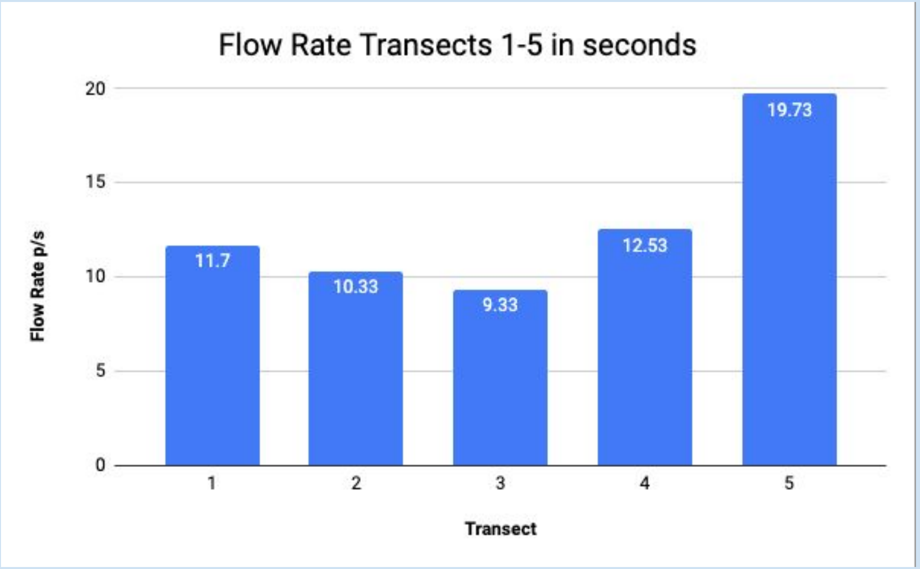

Cobble Size for Transect 2, in meters
150
100
50
0
Cobble Size
80
95
128
67
95
109
109
54
95
128
0.5m
1m
1.5m
2m
2.5m
3m
3.5m
4m
4.5m
5m
Transect

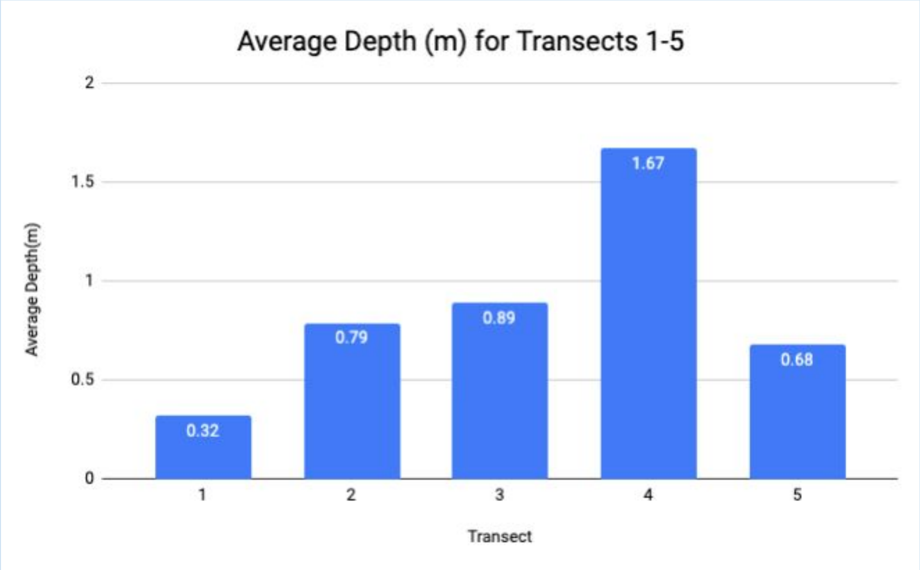

Cobble Size for Transect 3, in meters
125
100
75
50
25
0
Cobble Size
95
54.5
95
95
114
32
45
55
45
45
0.5m
1m
1.5m
2m
2.5m
3m
3.5m
4m
4.5m
5m
Transect


Cobble Size at Transect 4, in meters
200
150
100
50
0
Cobble size
128
77
95
128
128
95
128
32
154
32
0.5m
1m
1.5m
2m
2.5m
3m
3.5m
4m
4.5m
5m
Transect


Cobble Size at Transect 5, in meters
200
150
100
50
0
Cobble size
95
64
32
45
180
45
48
16
160
32
0.5m
1m
1.5m
2m
2.5m
3m
3.5m
4m
4.5m
5m
Transect

Data cont.


Flow Rate Transects 1-5 in seconds
Flow Rate p/s
20
15
10
5
0
11.7
10.33
9.33
12.53
19.73
1
2
3
4
5
Transect


Average Depth (m) for Transects 1-5
Average Depth(m)
2
1.5
1
0.5
0
0.32
0.79
0.89
1.67
0.68
1
2
3
4
5
Transect

Analysis/Conclusion

- Correlation between faster flow rates and smaller cobble size
  - Transect 5 had the fastest flow rate and also had the smallest relative cobble size
  - Transect 4 displayed a similar pattern
  - Inversely Transects 2 and 3 had the two slowest flow rates, and displayed larger cobble sizes in their respective transects

- Overall trend of smaller cobble sized upstream (transect 5) in faster, higher elevated areas while there are larger cobble sizes in slower, lower elevated (transect 1) areas

Work Cited

Physical Geology, *Stream Erosion and Deposition*.

https://opentextbc.ca/geology/chapter/13-3-stream-erosion-and-deposition/