Pebble Count 2016 vs. 2017 in Copeland Creek

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Introduction and Background

Heavy rainfall can affect an ecosystem in many different ways, specifically the morphology of a creek. Previous results have shown the number of cobbles has decreased further downstream, correlating with the increase in bedrock downstream. This has an effect on fish population in the three designated test sites, as well as downstream. Proper pebble count is an essential factor to know about creeks and rivers because of the implications it has on what the creek can sustain. Evaluating the pebble count at Copeland Creek and comparing it to previous data, allows us to see how much the sediment had changed over a period of a year. If a pebble count is too small or too large, it can significantly impact what life the creek can support, from plants to macroinvertebrates. This experiment is also helping to monitor channel morphology in attempt to predict erosion and sedimentation rates.

Research Methods

We surveyed Copeland Creek channel morphology and pebble size distribution along three perpendicular transect lines located within the portion of Copeland Creek running through Sonoma State University.

We first took a pebble size distribution from the three transect lines along Copeland Creek.

We took measurements of length, width, and depth of pebble along the transect lines.

Once measurements were collected, we calculated volumes. The volumes were then used to determine a size class of cobbles, boulder, or bedrock. Cobbles were determined to be 100 cm^3 or less, boulders 101-999 cm^3, and bedrock 1000 cm^3 or more.

We created graphs to compare cobble size distribution and to compare our data to last years data.

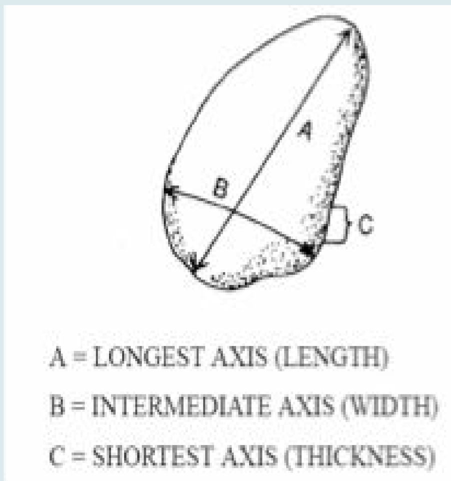

Figure 1: Method used to measure the rocks.

Study System

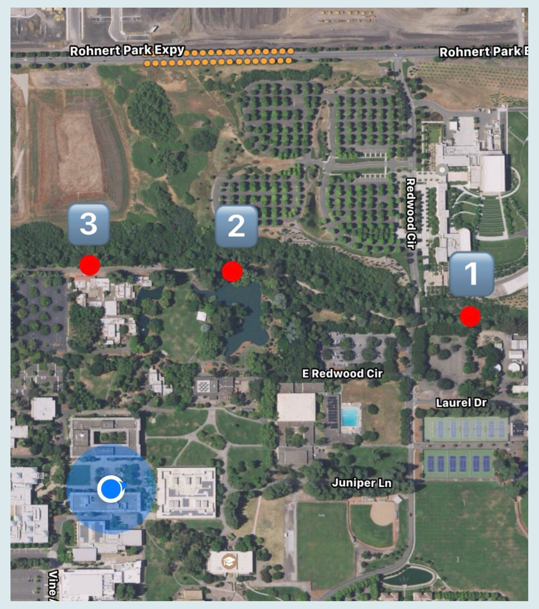

Figure 2: Testing sites; 1 is Butterfly Garden, 2 is Ponds, and 3 is Art Building.

Figure 3: Cerena Clifford and Grant Morely seeking measurements at site 3

Figure 4: Cerena Clifford measuring rocks while Serena Vesia records the data.

Acknowledgements

We would like to acknowledge Wendy St. John for supporting and guiding us through our project and for giving us a helping hand.

Results

The trends we found in our data were that, upstream the rocks are generally bigger whereas downstream the rocks are noticeably smaller. This is intuitive because as your travel downstream rocks can chip and become more rounded out and turn into pebbles rather than boulders. This was the same trend with the previous data, too.

At site 1, something that was interesting was that there were 2 bedrock in the creek both last year and this year. It could be that those 2 rocks were there last year when they tested and just haven't moved.

The data answers our question by proving that the rainfall was so heavy this year that it affected Copeland Creeks Morphology.

There were noticeably less boulders and more pebbles at all three sites validating that the increase in rain this year increased the flow rate which made the rocks travel at a faster pace, breaking them down into pebbles.

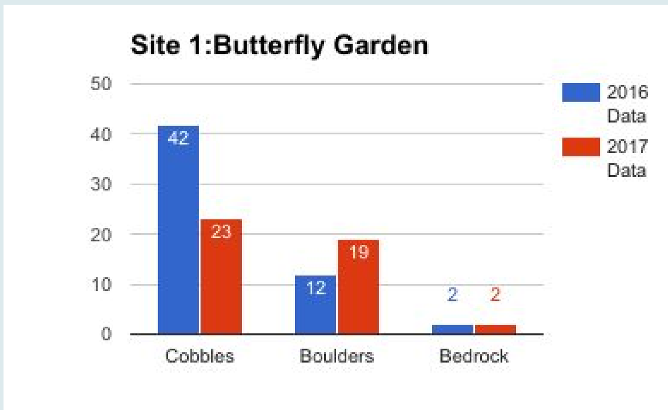

Figure 5: Data taken from Site1, this year and last years data combined.

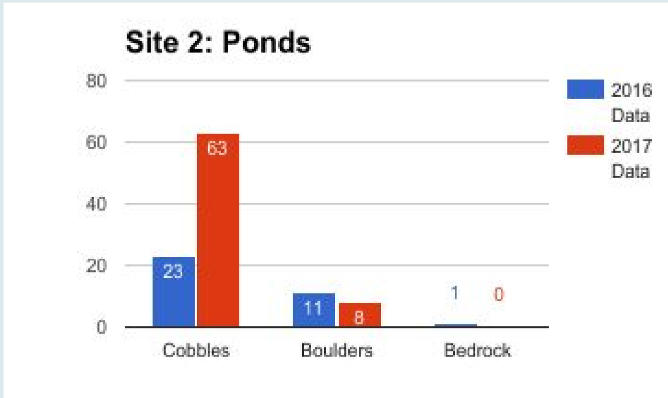

Figure 6: Data taken from Site 2, this year and last years data combined.

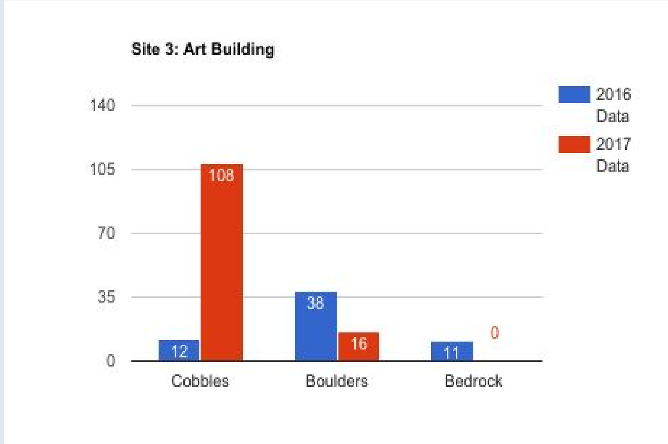

Figure 7: Data taken from Site 3. this year and last years data combined.

Discussion

To interpret our data, we compared our findings to last year's findings to see if the heavy rainfall from winter had affected Copeland Creek's morphology.

Our data relates to the previous data set because we tested at the same spots to get accurate data and it lead us to the information that a lot has changed since the last time the data was taken.

To further investigate the question, our data can be considered for future experiments having to do with Copeland Creek and pebble count.

It would be interesting for future students to do the same experiment and keep adding to the data set alongside the 2016 and 2017 data. To do so, they should take data at the same three spots to show consistency.

Figure 8: Grant Morley gathering data along the transect line at our second location (Ponds)

Conclusions

We found that the heavy rainfall following the drought had ranging effects on the size of the rocks in the creek throughout the three different sites. There are more pebbles on average this year, because in earlier years, due to the years with the drought, the rocks broke down a lot to stages smaller than pebbles, while new rocks were unable to flow in from upstream. This data will provide the possibilities of seeing some kind of trend in the future if the research is continued, and can give people concerned about native fish populations an idea of what kind of spawning habitat the fish have as a result of the rainfall.

References

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