An Introductory Sedimentological Analysis of the Eugene Millrace

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Introduction

The Eugene Millrace has a storied and varied history. Originating as a means for mill power within the city of Eugene, to a place of leisure for citizens, to its current state of limbo while being swallowed by a rewilding ecosystem, its role within the context of the Eugene community has been ever-changing. It is particularly notable for being half man-made and half natural, even within its short above-ground length of approximately 1.59 miles. With the introduction of the University of Oregon Knight Campus, to be built within the next five year on the north bank of the channel, the discussion has again arisen of what to do with this living piece of history. I wanted to explore the inner workings of this river, and decided that a good place to start would be at the very base of the channel -- its deposited sediment.

Though the research conducted was not the most advanced, nor was it the most accurate, this was an analysis which, to my knowledge, has never previously been conducted on this tiny offshoot of the Willamette River. Therefore, it is imperative that, due to the current state of the Millrace, more geological work such as this be done in order to determine what the best course of action to impart on this channel will be.

Abstract

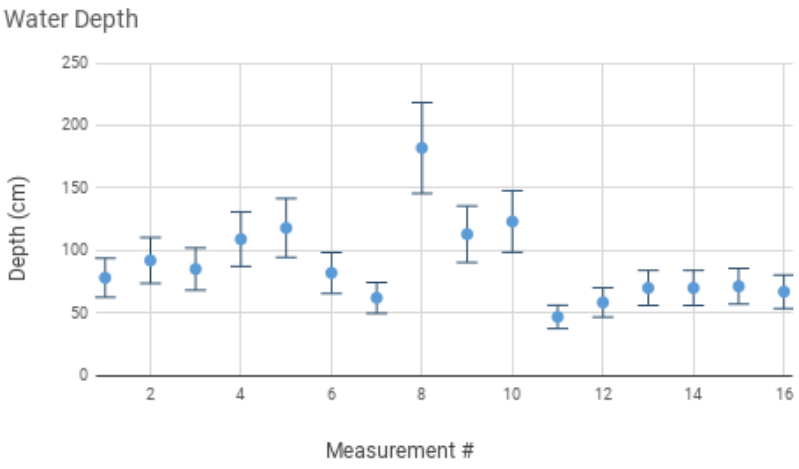
This study examines the depth of sediment and water level within the Eugene Millrace. Using a simple measurement method, we determine an elementary baseline with which we can determine the general layout of the bottom of this channel. These measurements were taken over the course of two days with approximately six hours of field work. I hypothesized that the

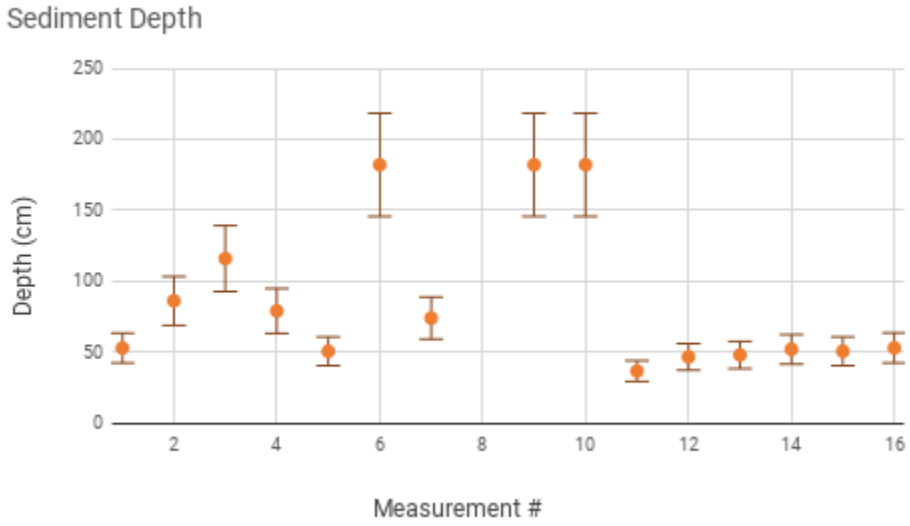
sediment of the Millrace would stay at or around a foot in depth, and would remain relatively linear throughout the extent of the channel. Our findings concluded that this hypothesis was completely false. While this was mostly obeyed within the artificial portion of the Millrace, the natural portion followed no clear correlation, and the sediment ranged from only around 53 centimeters to over six feet in depth.

Methods

Due to a lack of access to more advanced equipment as well as a desire for simplicity, our method for measuring water and sediment depth was extremely simple. Until approximately measurement number eight, we used a six-foot rebar rod and stuck it into the center of the channel and pushed it into the stream channel until it hit the top of the sediment. We then removed the piece of rebar, marking by hand the point at which the meniscus of the water lay when the bottom of the rebar had reached the bottom of the water in the channel. We then recorded the distance from the hand marking to the bottom of the rebar using a measuring tape, which would signify the water depth in the channel at this point. Using the same method, we would then push the rebar into the sediment until it hit bedrock, and take that measurement, then subtract the measurement of the water depth at that point to find an approximation for the depth of the sediment. Each measurement was taken from the center of the channel. Sixteen measurements were taken overall. The measurements were taken by canoe, and a Garmin GPS unit was used to record the latitude and longitude in degrees, minutes and seconds. The sites where measurements were chosen tended to be a mix of typical straight channel areas, areas where there are pumps, sandbars, and bends in the channel.

Results





Measurement #	Water depth (cm)	Sediment depth (cm)

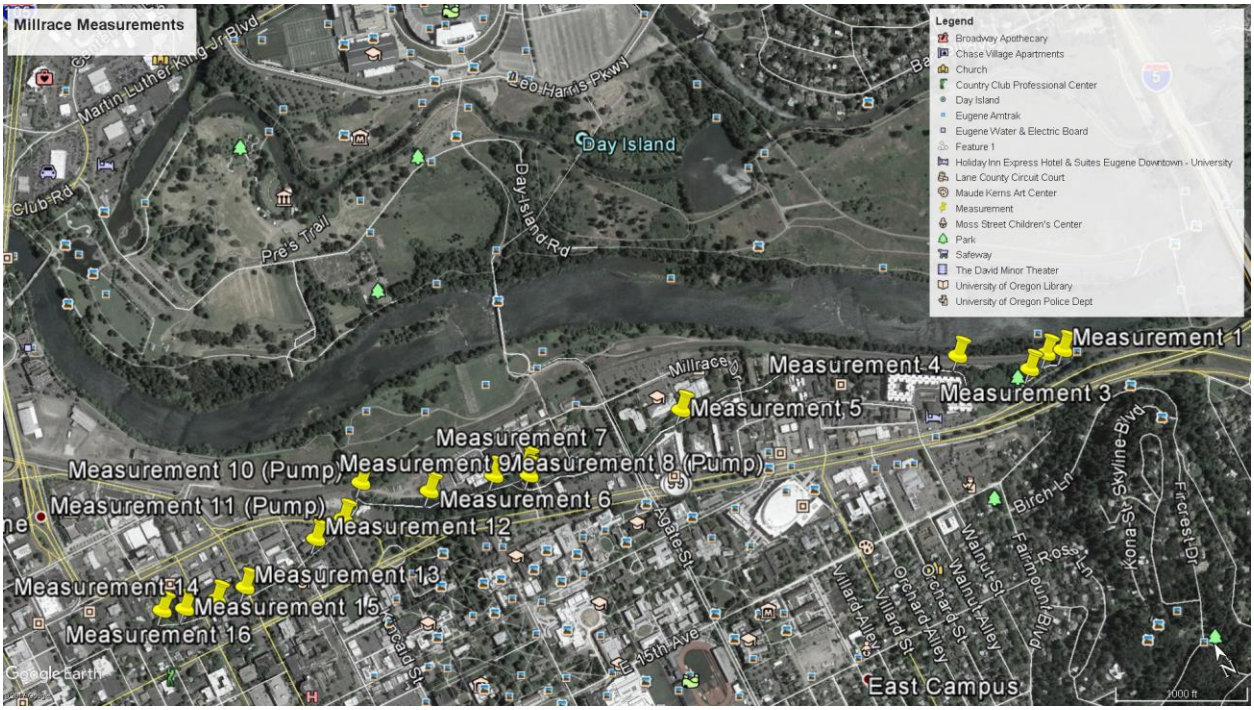
1	78.1	52.9
2	92	86.1
3	85.1	115.9
4	109	79
5	118	50.58
6	82	**182**
7	62	74
8	**182**	
9	113	**182**
10	123.1	**182**
11	46.8	36.6
12	58.4	46.6
13	70	48
14	70	52
15	71.3	50.6
16	67	53

*Bolded values are the deepest depth that we could measure; it is possible that the actual depth is greater

*Blank measurements are those for which we could not achieve an accurate approximation

Discussion

Though I had hypothesized that the sediment and water level would remain static throughout the entire length of the Millrace, this hypothesis turned out to be false. I also hypothesized that the sediment would remain at around a foot or less. This was also false. The Millrace is composed of three distinct portions: a natural slough, which was a former channel of the Willamette River, an artificial man-made portion, and an underground portion. The measurements were taken at sixteen places not including the underground portion.



The noticeable gap between measurements four and five were due to the presence of massive fallen trees on either side which blocked access to the area by canoe.

While the Millrace was in its artificial slough, it mostly followed the hypothesis for which I had predicted. The sediment and water levels were mostly linear, and they tended to be around a foot or less. The artificial slough can be seen in measurements eleven through sixteen. However, within its natural channel, the Millrace had almost no pattern in terms of sedimentary deposition. There was no clear relationship between distance from its origin and the amount of

sediment accumulated, nor was there a striking relationship between the water level and the depth of sediment.

The only possible relationship notable was the depth of water and sediment next to the two pumping stations in the natural slough (measurements eight and ten). There appeared to be a significantly higher water and sediment level at these two locations than the surrounding areas, but a more intensive analysis would need to be done in order to establish a clear connection between the two.

The chaotic nature of the water and sediment in the natural slough is most likely due to its use as a channel by the Willamette river for years before it was relegated to the Millrace alone. Due to the meandering/anastomosing nature of the Willamette, the sediment in this channel has most likely been deposited unevenly and various different points, as well has been subject to mass wasting events (sediment carried from landslides upstream, storms, etc.) before its relative occlusion from such events since the Millrace's inception in 1850. The more predictable and low level of sediment found within the artificial slough is most likely due to the nearly entirely linear channel present in this portion of the Millrace, as well as the even deposition of sediment since its inception. Surprisingly, the pump in this portion of the channel (measurement eleven) has slightly *lower* water and sediment levels than the following measurements. It is unclear how much of the sediment within the natural and artificial sloughs are anthropogenic, though I plan on coring and dating various samples using the cesium-137 isotope at a later date to determine this influence. Using the sediment levels collected here, I also plan on coming up with a general rate of sedimentary deposition for the channel.

Conclusion

The Eugene Millrace has proven to be far less predictable than it was believed to be upon our first impression. Although the rate of water flux is relatively low, it is as dynamic and evolving as any other river, though relegated to the confines of human constraint it may be. While I hypothesized a very predictable and linear level of sediment throughout the entire channel, this was proven by the data to be completely false. I chose to do this work on the Millrace because of the current debate about its future use, and the presence of the Knight Campus adjacent to it. The sedimentary levels and deposition rate would no doubt be of use to those who wish to build on or around the channel, or use the Millrace for their own personal research. Future prospects for the analysis of the sediment in the river include the aforementioned cesium dating using cores extracted from similar areas along the river, as well as a sediment map of the bottom of the channel by using a series of transects.

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References

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