

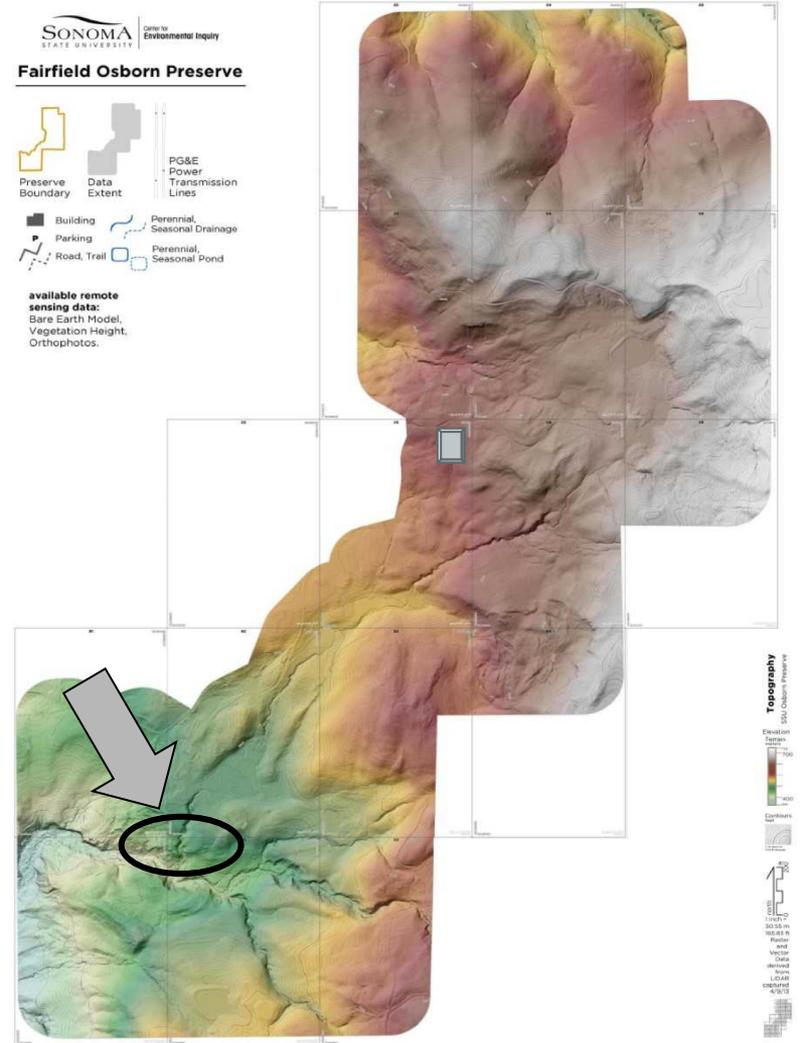
# Erosion at the Fairfield Osborn Preserve



Jose Ochoa, Lauren Cleveland, Emily Vargas, and Luis Luna

# Hypothesis

- Research Question: How is the amount of soil erosion of the stream bank changing over time?
- Hypothesis 1: Over the past year, we expect more eroded soil around the stream banks.
- Hypothesis 2: We expect more erosion to occur in areas where there is less vegetation.



# Background I

- Erosion is harmful to the Osborn Preserve
- Sediment transportation can cause harm to the local wildlife
- Plants have extensive root systems that can help grab onto soil and keep the soil clumped together (Finio, B., 2018)

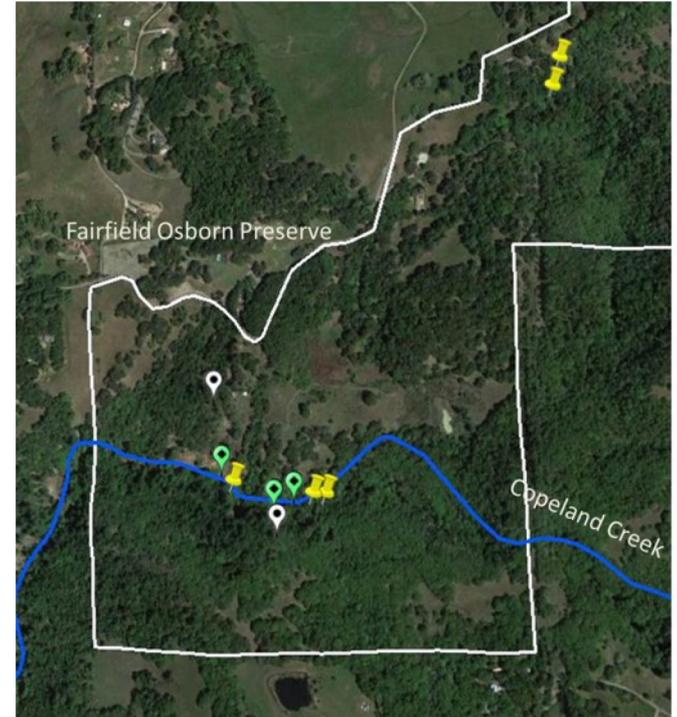
<http://web.sonoma.edu/cei/images/osborn/osbornbanner3.jpg>



[https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng\\_p037/environmental-engineering/can-plants-stop-soil-erosion](https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng_p037/environmental-engineering/can-plants-stop-soil-erosion)

# Background II

- Michelle Goman has been researching erosion at the Fairfield Osborn Preserve (Copeland Creek) from 2013-2018
- We can reference her data with ours and compare how the erosion has progressed over time using erosion pins
- Erosion pins are metal rods with bright colored tops

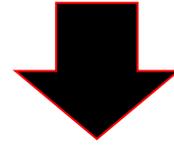


[http://web.sonoma.edu/waters/projects/sediment/sediment\\_erosion\\_monitoring.html](http://web.sonoma.edu/waters/projects/sediment/sediment_erosion_monitoring.html)

# Methods I

- We measured the change in amount of erosion in areas close to the creek; using erosion pins put in by Michelle Goman
- We measured at the same spots as the previous study:
  - 9 out 15 pins in total (lower/upper cross section-North)
- Noticed differences in plant life near erosion pins (low to high)

Erosion Pin



<https://www.mwmo.org/projects/riverfront-regional-park/>

# Methods II

- Equipment needed: 2 Tape measures
- Measurements in cm
- GPS iPhone Application (wasn't precise, didn't work)
- Camera (iPhone)

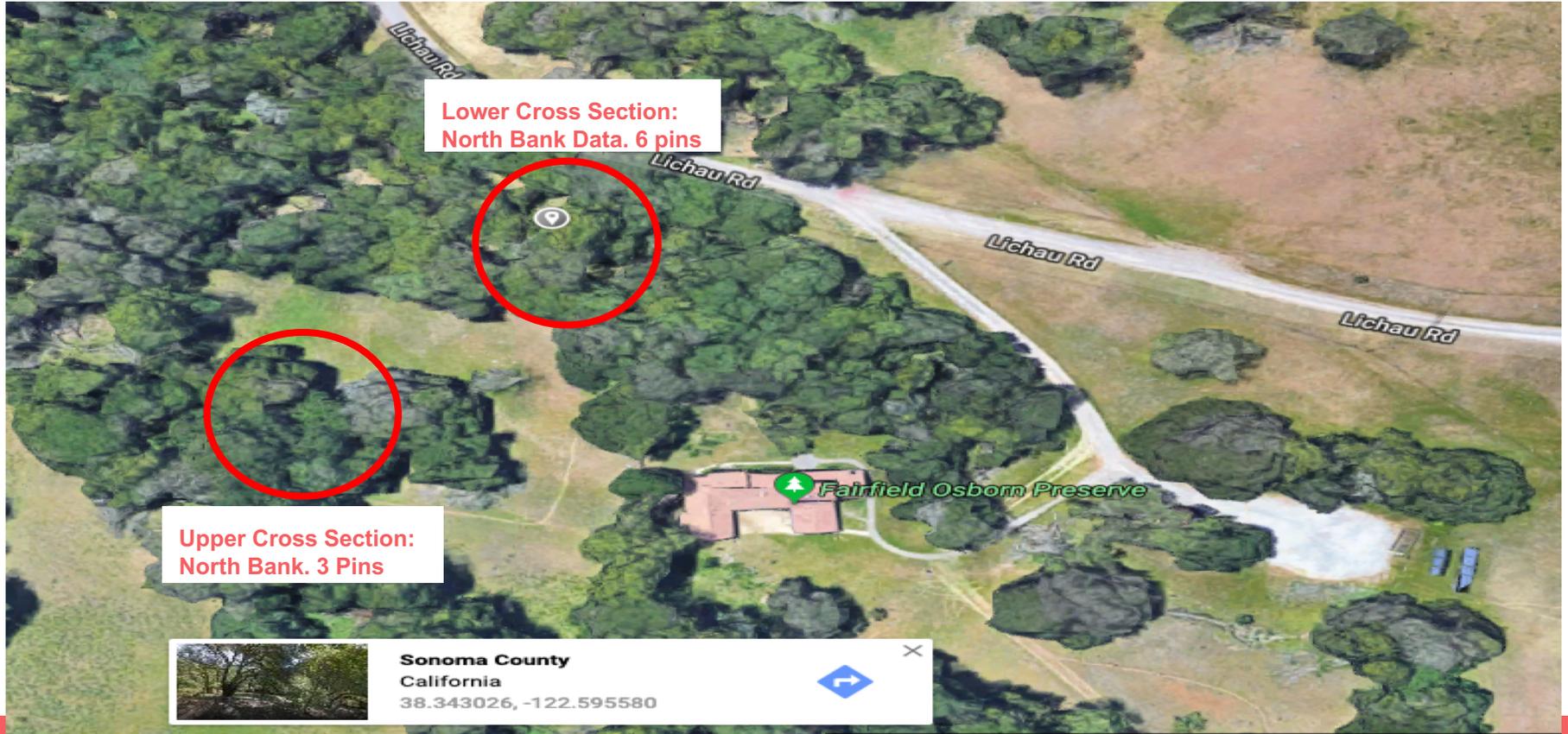


<https://www.maxpixel.net/Maps-Gps-Map-Icon-Google-Maps-Logo-Navigation-1797882>



<https://www.keson.com/product-category/long-tapes/>

# Map of Fairfield Osborn Preserve

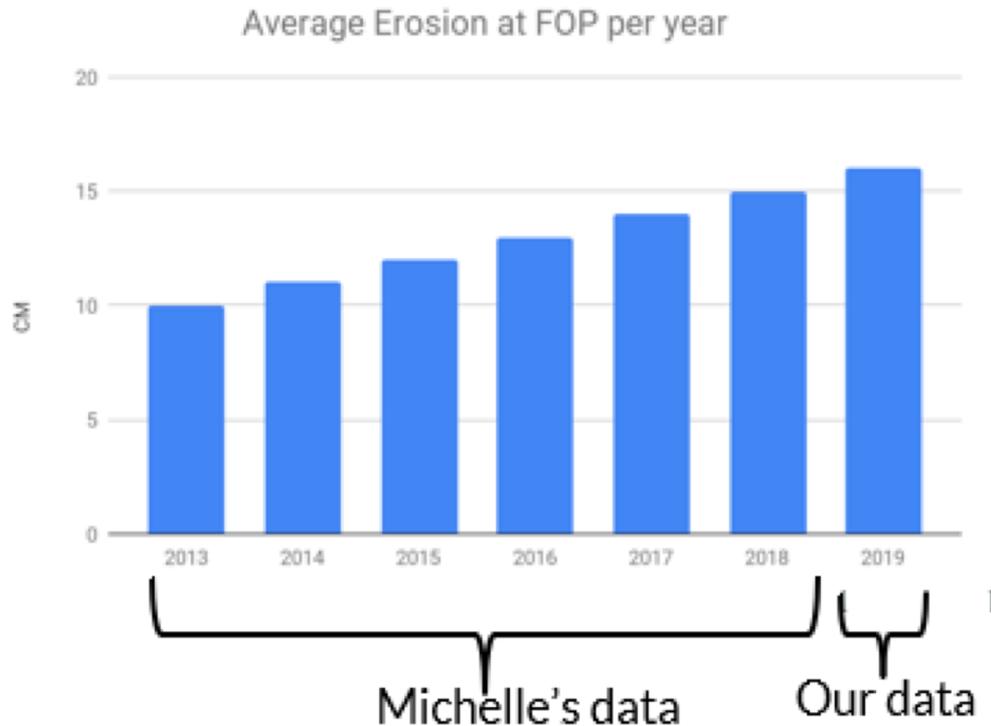


Lower Cross Section:  
North Bank Data. 6 pins

Upper Cross Section:  
North Bank. 3 Pins

Sonoma County  
California  
38.343026, -122.595580

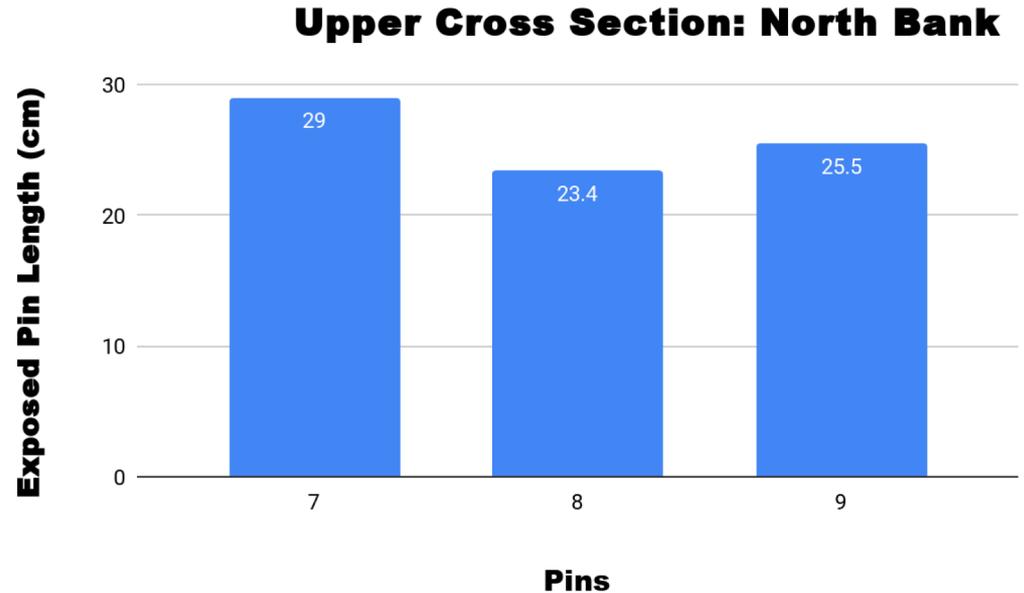
# Original Proposal Graph



# Upper Cross Section: North Bank Data

Upper Cross Section: North Bank	
Pin	Measurement (cm)
7	29 
8	23.4 
9	25.5 

KEY	 Low vegetation
	 Medium vegetation
	 High vegetation



# Upper Cross Section: North Bank Data

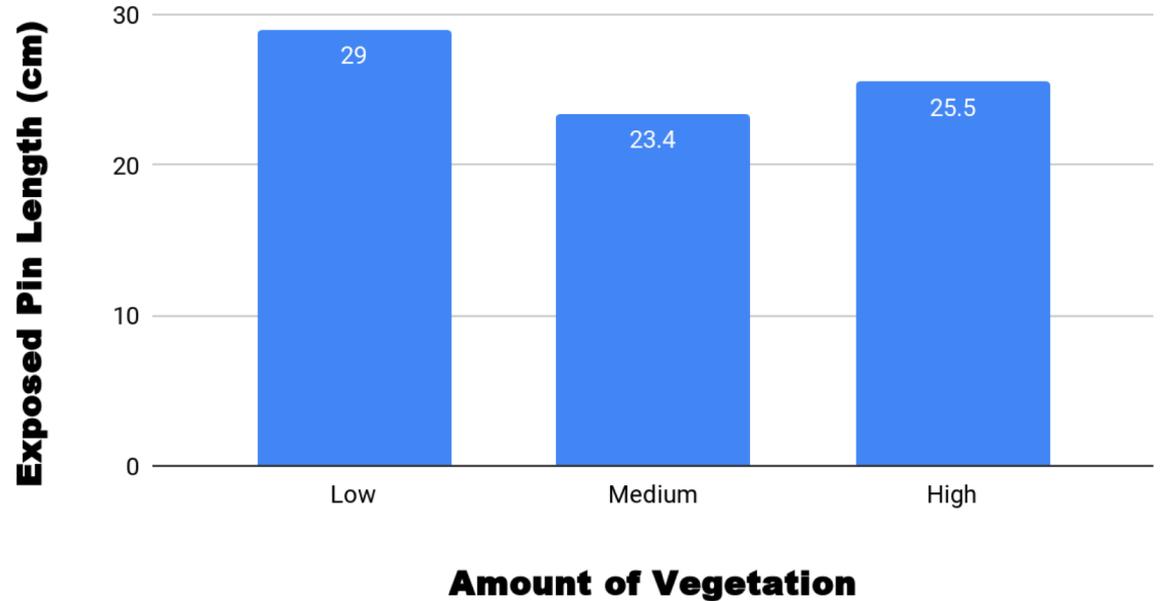


Pin 9  
(25.5cm)



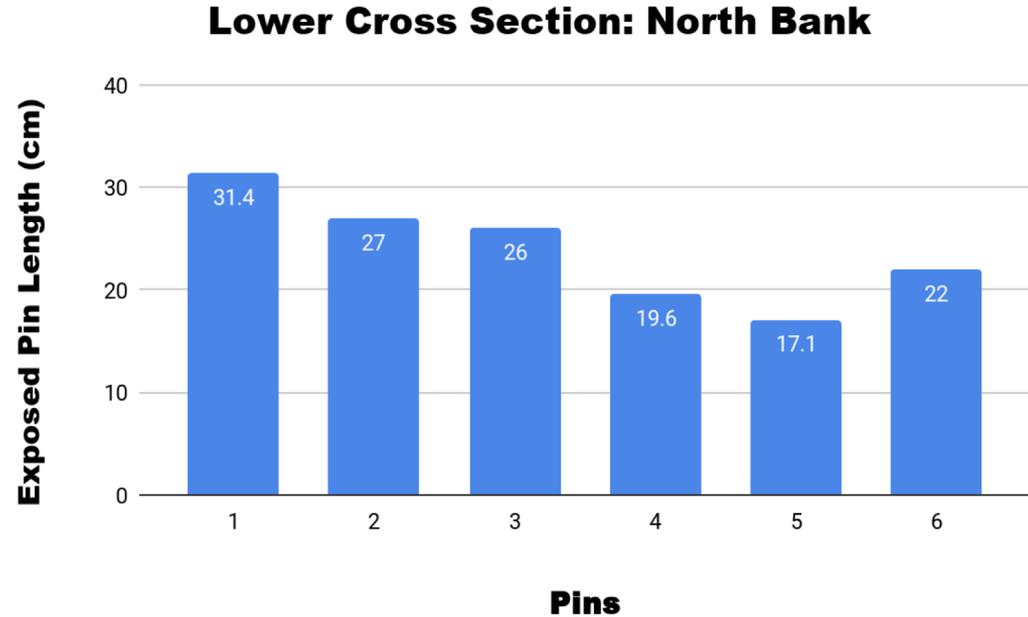
Pin 7  
(29cm)

## Amount of Erosion vs. Amount of Vegetation

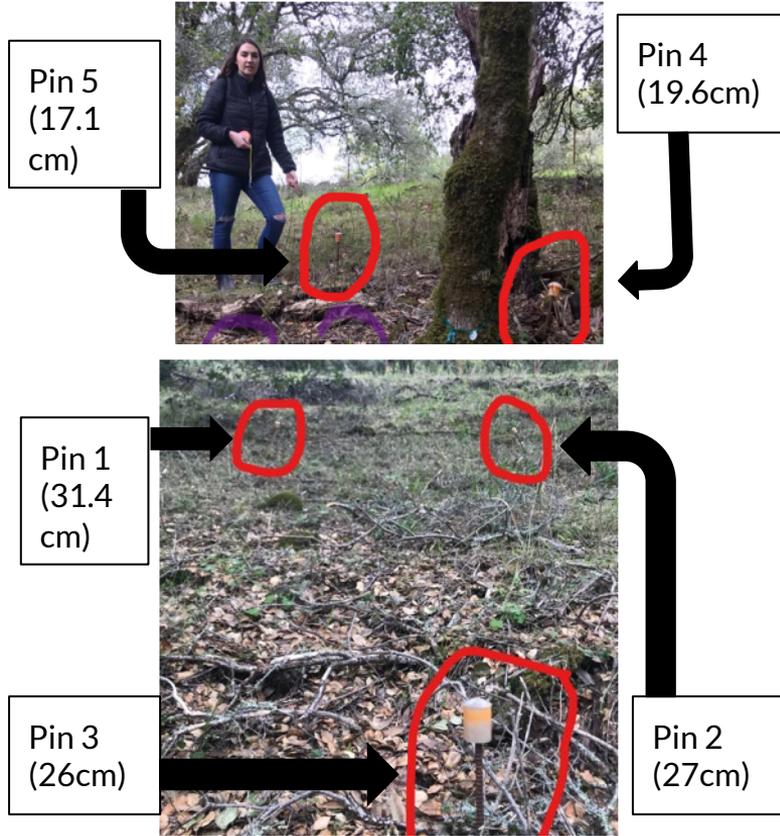


# Lower Cross Section: North Bank Data

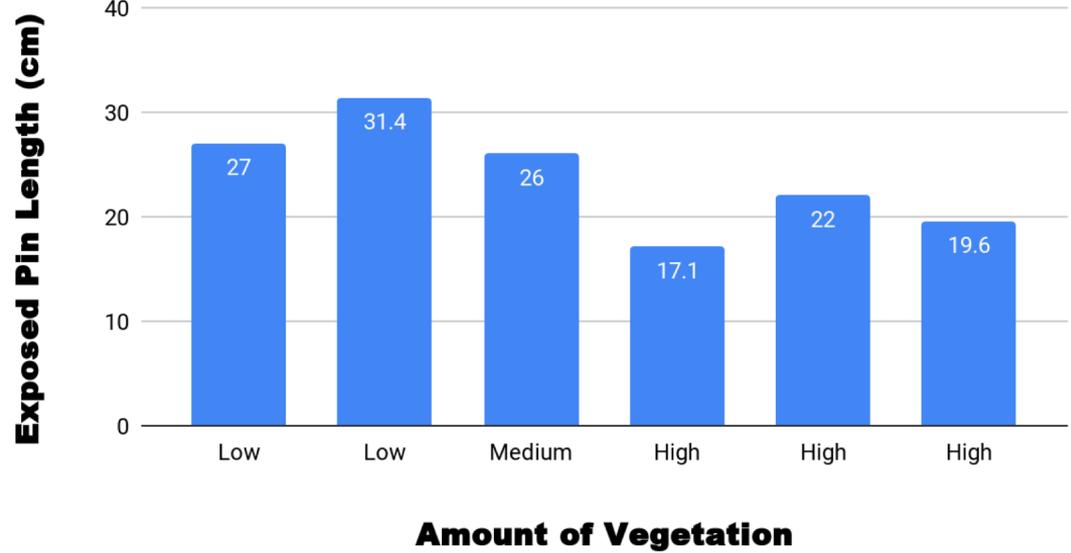
Lower Cross Section: North Bank	
Pin	Measurement (cm)
1	31.4 
2	27 
3	26  
4	19.6   
5	17.1   
6	22   



# Lower Cross Section: North Bank Data



**Amount of Erosion vs. Amount of Vegetation**



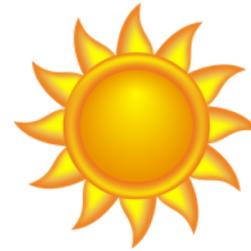
# Conclusion I

- Graph of the Upper Cross Section: North Bank shows noticeable erosion
  - average amount of erosion is about 25.9cm
- Graph of the Lower Cross Section: North Bank had quite a bit of noticeable erosion
  - average amount of erosion is about 23.9cm
- From the averages of all the data, we see there is more erosion in the Upper than the Lower

# Conclusion II

- Can't conclude for 100% certainty that there is more erosion on the Upper than the Lower because of sample sizes (pin #, year)
- Unable to answer hypothesis 1
- Also unable to decipher which pins are which, can't compare the previous data collected
- Pins with trees/vegetation close by had slightly less erosion
- Both areas had a good amount of vegetation, but the Upper Section had less

# Significance



Erosion has multiple causes:

- Drought- lack of moisture in the soil, recession of roots/vegetation
- Heavy Rain- puts large amount of forces on the soil
- Other forms of erosion are not present on the osborn preserve (wind, tectonic plate movement, tillage)



# References

- Lawler, D. M. (1993), The measurement of river bank erosion and lateral channel change: A review. *Earth Surf. Process. Landforms*, 18: 777-821. doi:[10.1002/esp.3290180905](https://doi.org/10.1002/esp.3290180905)
- Finio, B. (2018, December 1). *Can Plants Stop Soil Erosion?* Retrieved from [https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng\\_p037/environmental-engineering/can-plants-stop-soil-erosion](https://www.sciencebuddies.org/science-fair-projects/project-ideas/EnvEng_p037/environmental-engineering/can-plants-stop-soil-erosion)