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SEDIMENTOLOGY AND CITIZEN SCIENCE: ECOLOGICAL MONITORING IN CARPENTER CREEK, KINGSTON, WA.

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Sedimentology And Citizen Science: Ecological Monitoring in Carpenter Creek, Kingston, WA

Quinn Habedank, Hanna Brush, Melissa Fleming

BACKGROUND & CONTEXT

- In 2012 and 2018, culverts were removed from Carpenter Creek, a tidal creek attached to a salt marsh
- The 2012 culvert removal was done at the mouth of the creek, and the 2018 culvert removal was done further upstream next to the salt marsh
- Stillwaters Environmental Center, a local ecological monitoring organization in North Kitsap driven by volunteers, conducted stream monitoring before and after the culvert removals
- Sediments were collected from Carpenter Creek from 2011 to 2021 and were sorted upon texture

Research Question

- How has the texture of the sediment bedded by Carpenter Creek changed over time in relation to the 2012 and 2018 culvert removals?

Methods

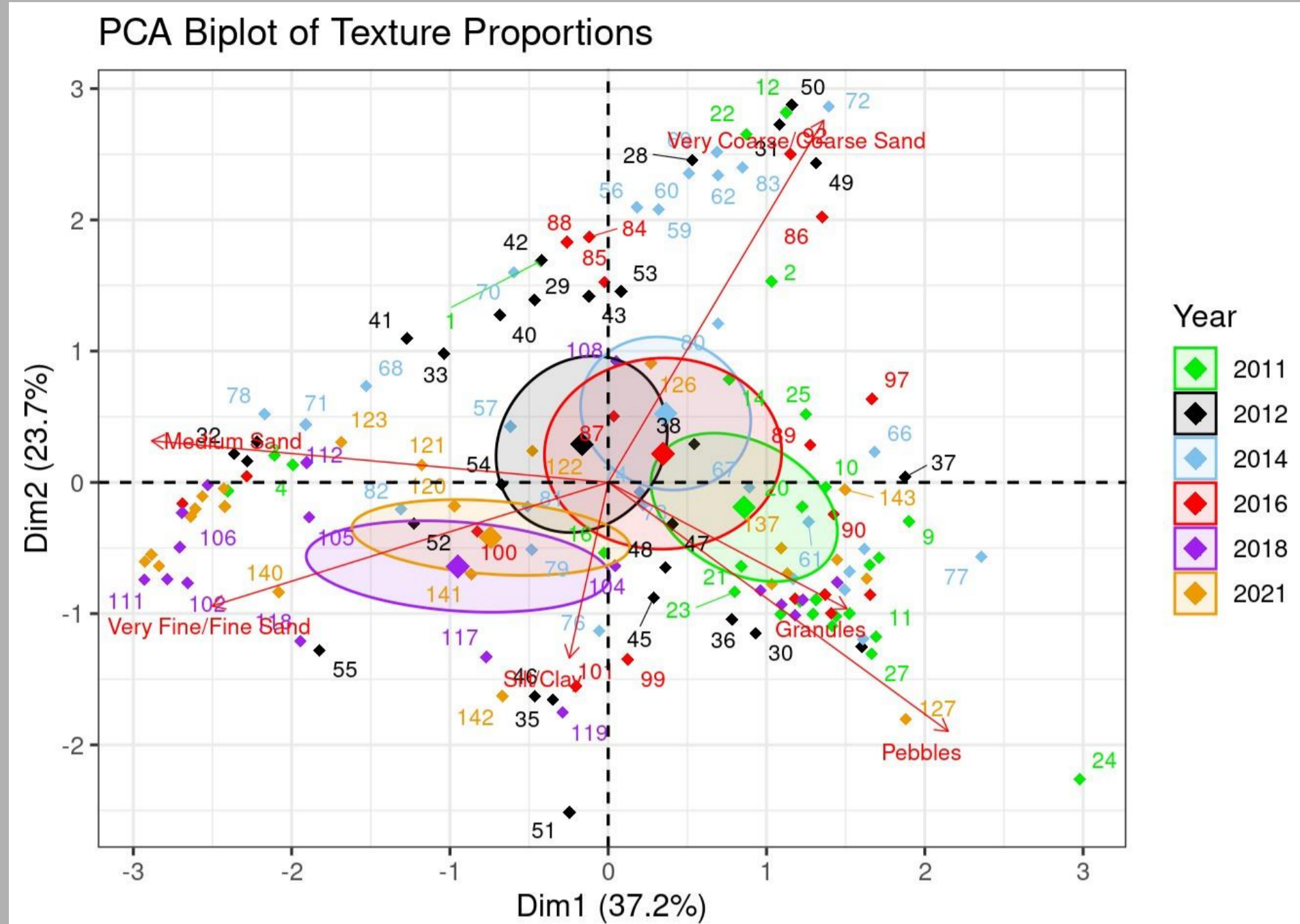
- Sediments were sieved into different size categories based upon the Wentworth scale, the sediment scale most popular among sedimentologists
- After sieving, each size grade of sediment was recorded by volume or mass
- For details on how our visualizations were generated, visit <https://github.com/quinnhabedank/SSEC-Sediment-Study-Stillwaters>

Acknowledgements

- We would like to thank the dedicated volunteers who have worked on this project for the past decade and the North Kitsap community at large for supporting Stillwaters Environmental Center

Contact Information

- For questions regarding the functioning of the R code, email Quinn Habedank at habedank@uw.edu
- For general information regarding the project, how to get involved, or how to contribute, contact Stillwater's Program Director, Dr. Melissa Fleming, at melissa@stillwatersenvironmentalcenter.org
- One can view Stillwater's website at <https://www.stillwatersenvironmentalcenter.org/>



Top

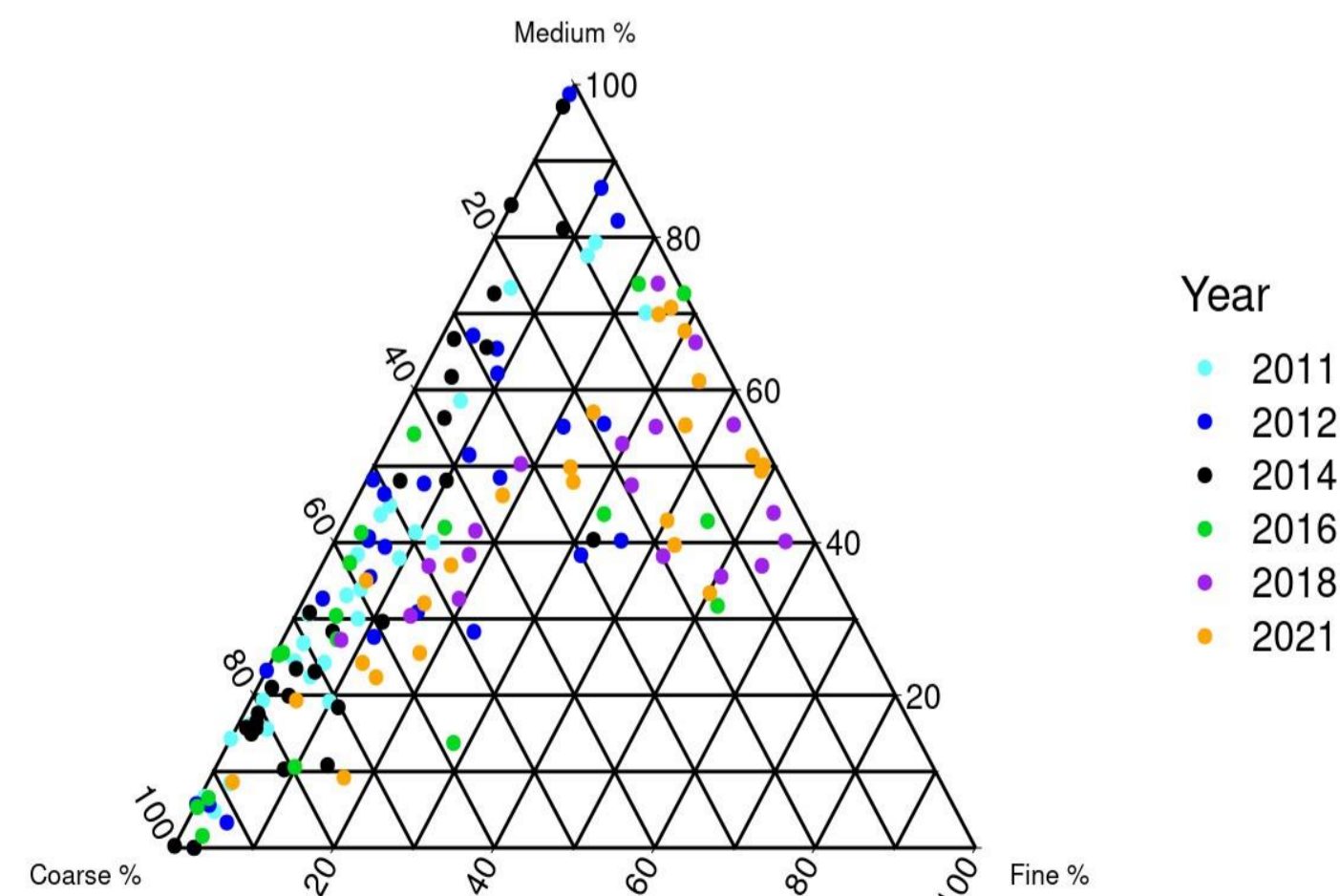
Biplot showing the results of Principal Component Analysis, a form of analysis where multiple variables are compressed down into two "Principal Components", allowing plotting on a 2D plane

Bottom

A ternary plot showing the relative percentages of coarse, medium, and fine sand over time. A ternary plot ("tern plot") is a triangular plot showing the relative percentages of three components

Tern plot of Sand Texture

Coarse/Very Coarse, Medium, and Very Fine/Fine Sand Percentages



Big Takeaways

- Looking at the biplot, we can notice a change in overall texture between 2011 and 2012 (corresponding with the downstream culvert removal) away from gravel and towards the finer particles
- Between 2016 and 2018 (upstream culvert removal) we can see a major shift towards more fine sand
 - This can be further observed in the ternary plot
- The culvert removals resulted in more fine sediment coming downstream
 - This can mean various things, but fine sediment coming from the marsh may signify a more natural sediment transportation regime
 - Restoration Sedimentology is an emerging field, and there is not that much existing literature on the subject
 - Sediment erosion and deposition is vital for building up wetlands
 - Volunteers and community based organizations can be part of the push to expand restoration sedimentology