

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

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## 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

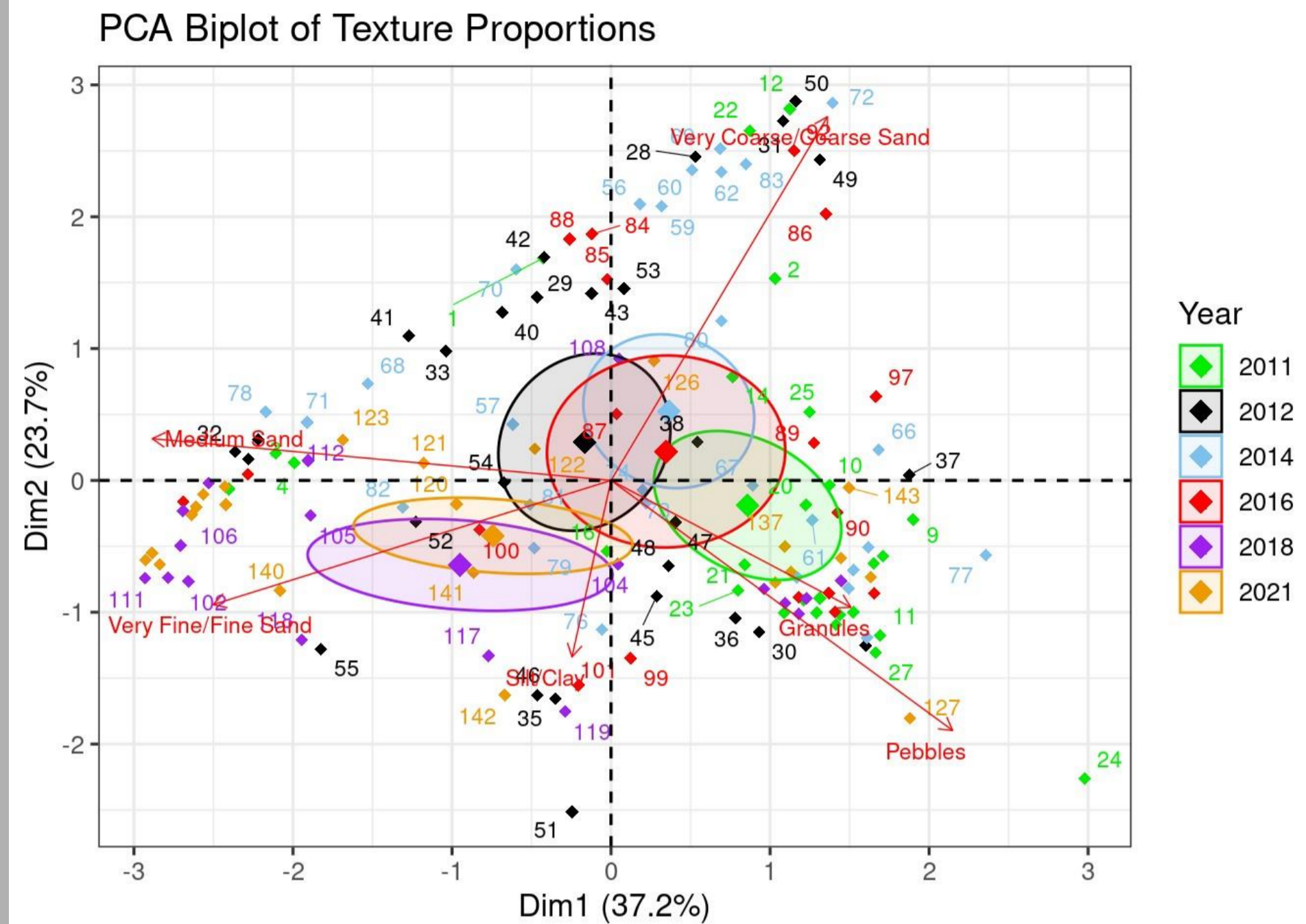
- Sediments were sieved into different size categories based upon the Wentworth scale, the sediment scale most popular among sedimentologists
- After sieving, each size grade of sediment was recorded by volume or mass
- For details on how our visualizations were generated, visit <https://github.com/quinnhabedank/SSEC-Sediment-Study-Stillwaters>

## 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](mailto: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](mailto:melissa@stillwatersenvironmentalcenter.org)
- One can view Stillwater's website at <https://www.stillwatersenvironmentalcenter.org/>



## Top

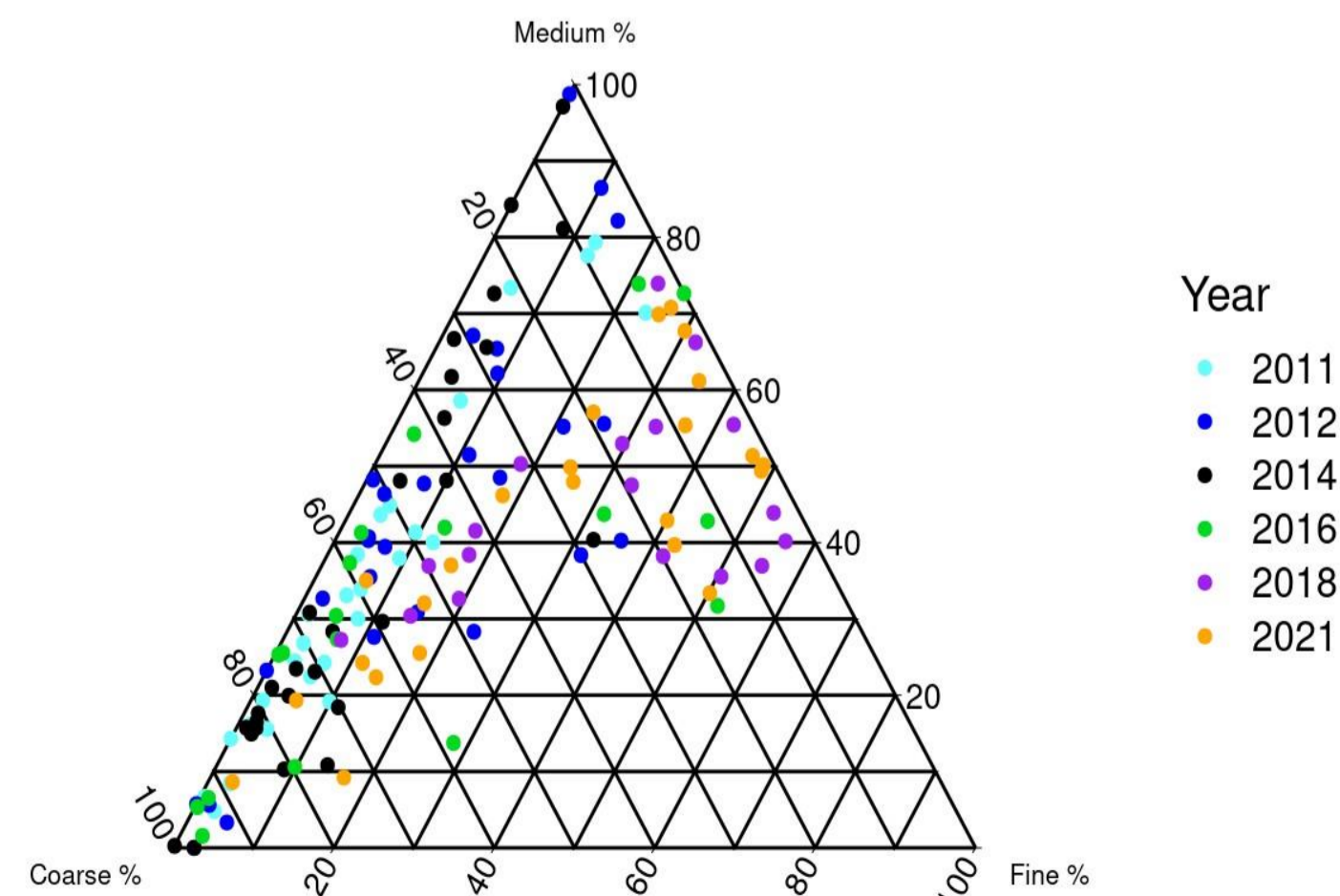
Biplot showing the results of Principal Component Analysis, a form of analysis where multiple variables are compressed down into two "Principal Components", allowing plotting on a 2D plane

## 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