

Sedimentary Petrology of Silt in the Puyallup River Watershed

TESC 499

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Introduction

The Puyallup River Watershed runs from the glaciers of Mount Rainier to the waters of Commencement Bay. Geologic and human-related changes to the watershed system and the surrounding landscapes can impact the composition of sediment and deposition patterns.

This study aimed to analyze the modal mineralogy of bedload silt from the Puyallup and White Rivers and South Prairie Creek to identify potential source indicator minerals. The Puyallup and White Rivers originate at different glaciers and their headwaters are surrounded by distinct rock types, while South Prairie Creek is non-glaciated. However, South Prairie and the White River were both introduced to lahar-derived materials through the Osceola Mudflow. As these rivers flow through the lowlands, all will most likely contain some Pleistocene glacial material. For these reasons, we expect the silt mineralogy from the Puyallup and White Rivers will be distinct; South Prairie Creek may display similarities to either of the others.

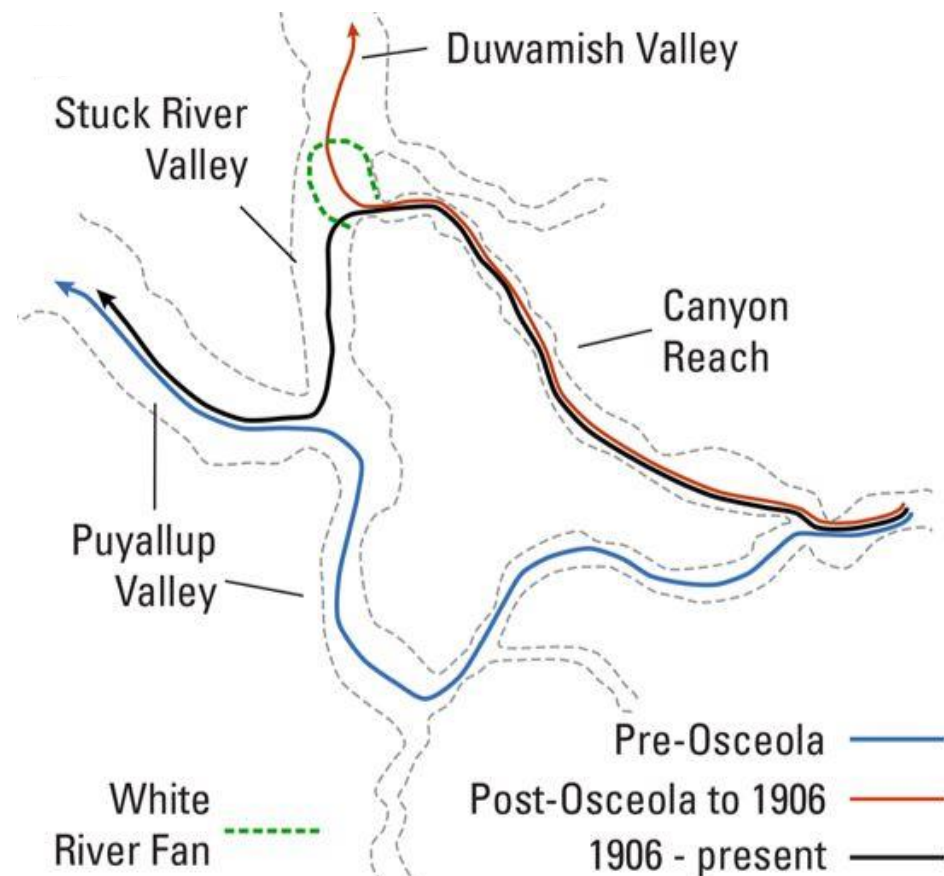


Figure 1: Map depicting the Pre-Osceola, Post-Osceola to 1906, and 1906 to present flows of the White River (Anderson and Jaeger 2021)

Methods

- Silt samples were placed on a slide prepped with adhesive and cured
- Samples were examined under a polarizing microscope (Leica DM 750P)
- Images of samples with plane and crossed polarizers were taken and edited in the Leica Application Suite, and grids were placed over the images using ImageJ
- The first 100 grains that fell under grid intersections were identified

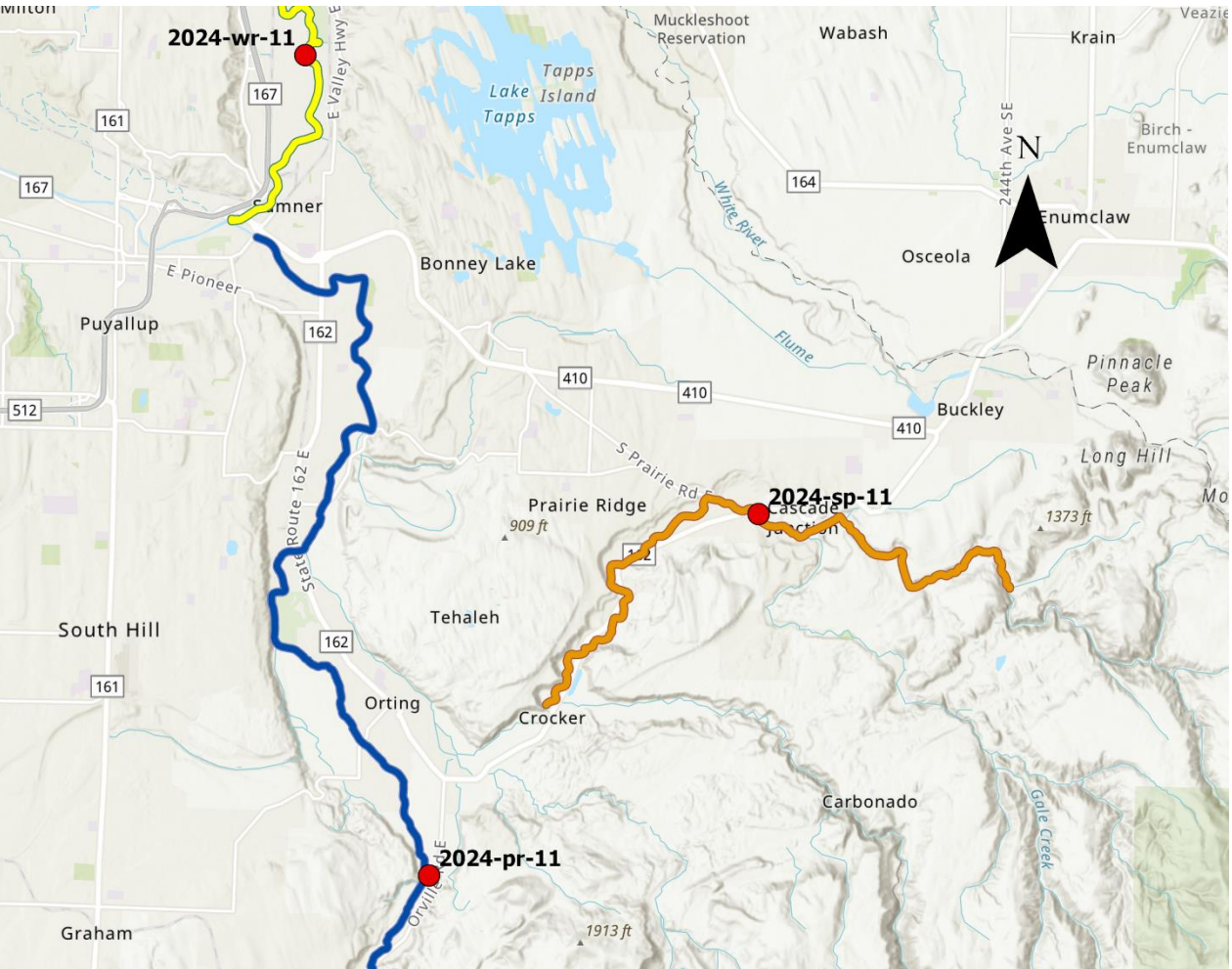


Figure 2: This map displays silt samples taken from the Puyallup River (2024-PR-11), South Prairie River (2024-SP-11), and the White River (2024-WR-11) in Washington State. Each sample location is indicated by a red dot, with individual rivers represented by distinct colors: Puyallup River in blue, South Prairie River in orange, and White River in yellow.

Results

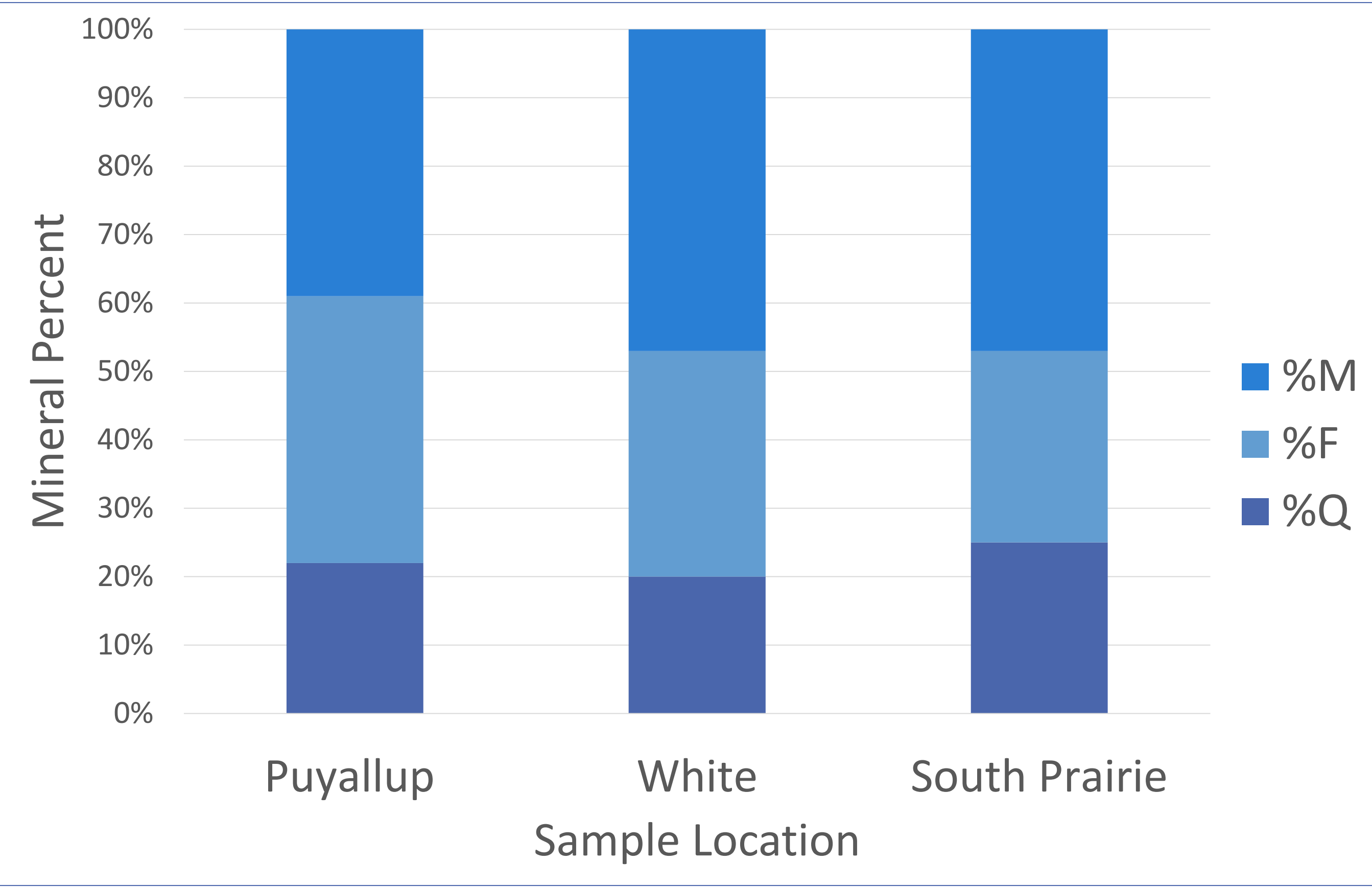


Figure 3: Total percentages of quartz, feldspar, and mafic minerals in the Puyallup, White, and South Prairie silt samples.

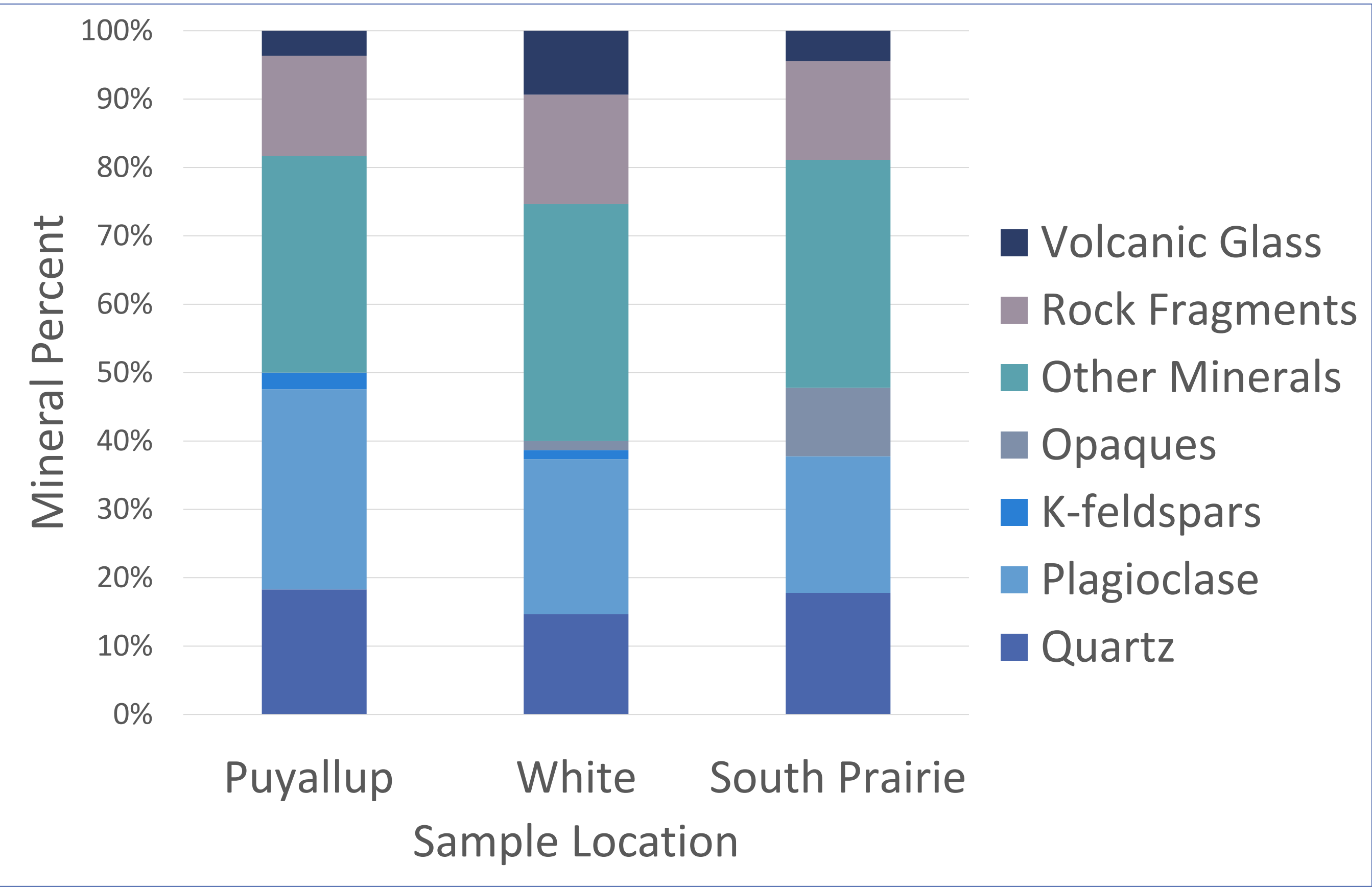


Figure 5: Total percentages of all identified grains in the Puyallup River, White River, and South Prairie silt samples.

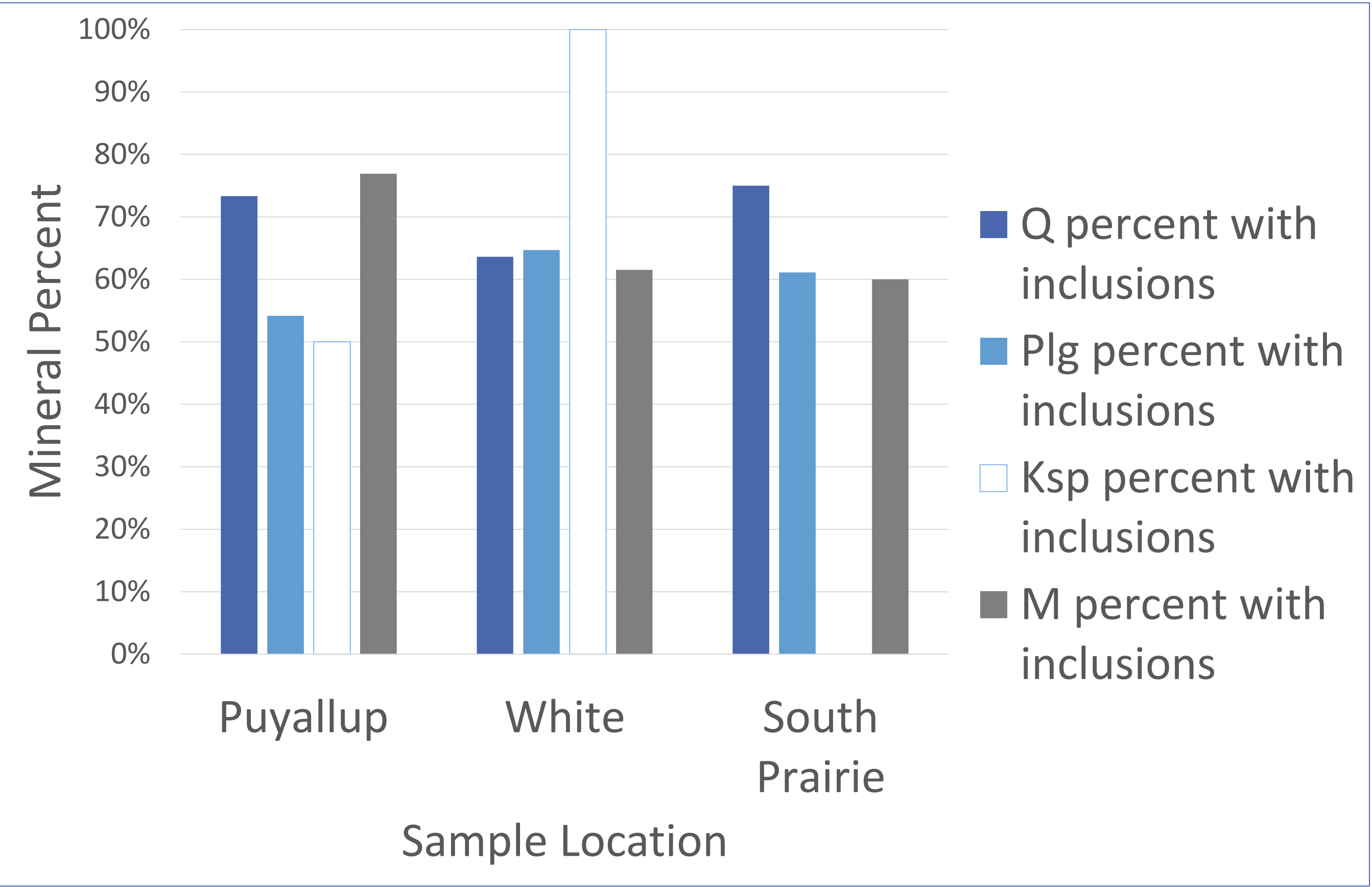


Figure 4: Total percentages of quartz, feldspars, and mafic minerals with inclusions in the Puyallup River, White River, and South Prairie silt samples.

Discussion & Conclusions

Discussion

- Feldspar and mafic minerals occurred in equal percentages in the Puyallup River sample while mafic minerals dominated the White River and South Prairie Creek samples
- White River sample contained more feldspar grains than South Prairie sample
- South Prairie sample contained more quartz grains than White River sample
- Small **differences** found between the samples suggest a **viable method** of **determining the origin** of silt in the watershed
- Mafic mineral **similarities** between **White River** and **South Prairie** samples suggest a **possible connection** between the **rivers' channels** in past geologic history

Future work

- Analysis of suspended sediment samples in these locations, additional bed sediment samples at different locations, samples taken closer to the glaciers of origin, and identification of “other minerals” category



Figure 6: Puyallup River at Riverside Park

References

Anderson SW, Jaeger KL. 2021. Course sediment dynamics in a large glaciated river system: Holocene history and storage dynamics dictate contemporary climate sensitivity. GSA Bulletin. 133(5-6):899–922. doi:10.1130/B35530.1.

Acknowledgements

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