Spatial and Temporal Trends in Salinization in the Northeast Branch of the Anacostia River

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Geol394

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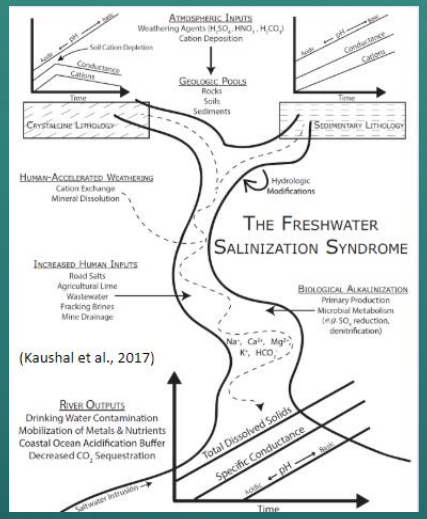
Abstract

Freshwater salinization is a growing environmental problem globally, but with local impacts. However, the spatial extent of salinization in watersheds and its impacts are not always known in urban river networks across finer spatial scales. I hypothesized that there are increasing spatial gradients of salinity within stream networks (specifically the Northeast Anacostia system) that traverses through urbanized environments, and that anthropogenic activity increases salinity in freshwater and its accumulation in watersheds.



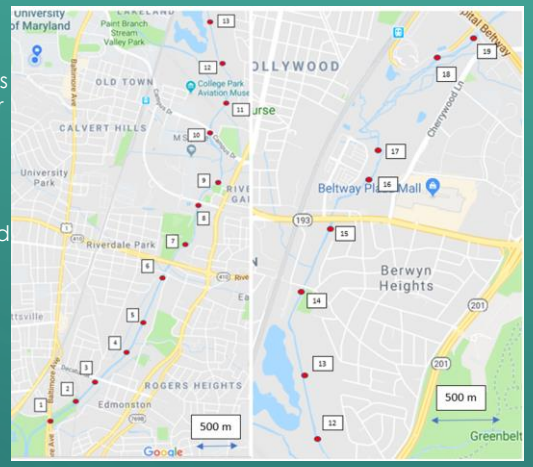
Methodology

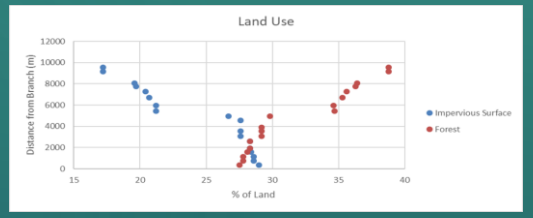
Sampling

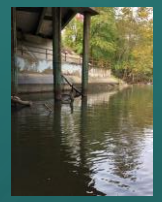
TOC

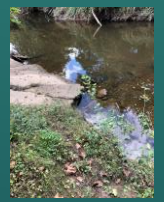
ICP-OES

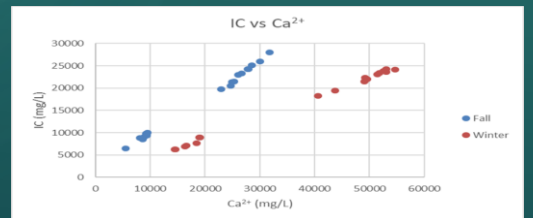
Sample Sites



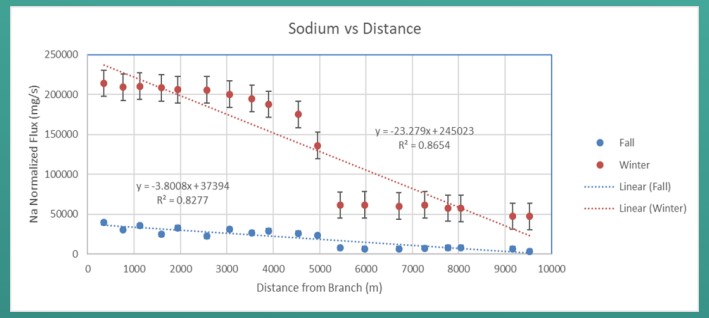


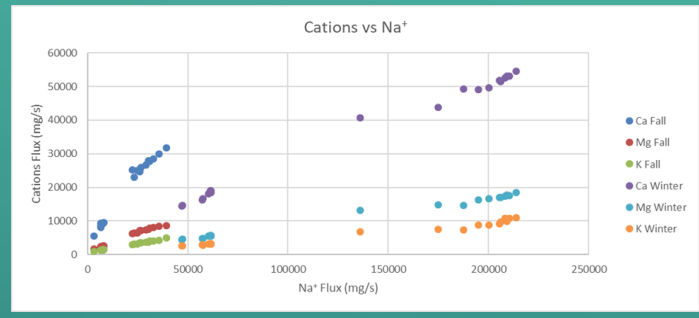


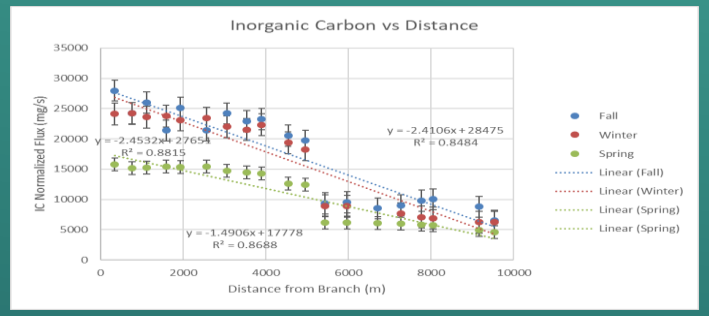


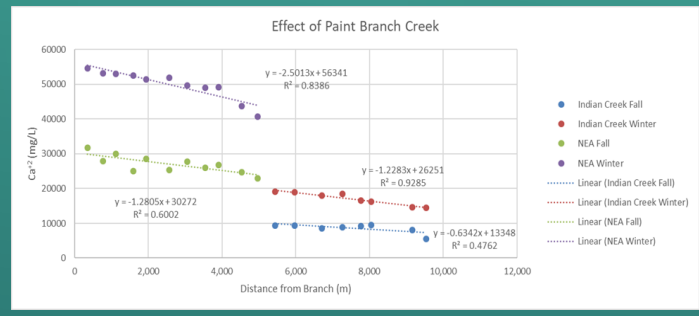


Results









Summary

Increases in all major cations as well as other proxies were noted as they accumulated downstream in correlation to impervious surface cover. These trends were even more pronounced in the winter, likely due to road salting's effect. This also shows that this stream system isn't regulating itself over time but is steadily increasing in salinity. These processes are exacerbating the salt levels of freshwater in the Northeast Anacostia River showing that even small localized watersheds experience freshwater salinization syndrome.

The process to remediate this continental scale change to freshwater ecosystems will be long and complex, but measures can be taken. Reducing or regulating road salts is an almost immediate thing that can help. Other deicers are available and being able to precisely control how much salt is used in each area can reduce excess salty runoff. Limiting or reducing impervious surface cover is another way to prevent this erosion into freshwater. Some locales offer grants to remove impervious surface cover or when building, utilize materials and designs that aren't impervious and won't erode negatively.

References

S. S. Kaushal, G. E. Likens, M. L. Pace, R. M. Utz, S. Haq, J. Gorman, and M. Grese, Freshwater salinization syndrome on a continental scale, Proc Natl Acad Sci USA January 23, 2018 115 (4) E574-E583; https://doi.org/10.1073/pnas.1711234115