

## Title

Ecological drivers of microbial community composition along river networks of Western Canada

## Introduction and Hypotheses

This project follows several rivers in British Columbia that originate in very different environments and pass through various topographies and anthropogenic influences before meeting to form one river. The various conditions that these rivers pass through ultimately alters the sediment composition within the rivers. It is hypothesized that chemical composition will have a greater effect on microbial community structure and function than geographical space, with anthropogenic pollutants causing the greatest change in this chemical composition. Inductively coupled plasma mass spectrometry (ICP-MS), along with alpha and beta diversity tests on 16S rRNA sequencing results of the river water and sediment samples will demonstrate whether this hypothesis is supported. ICP-MS was conducted in a triplicate for each of the sediment samples, and this data will be analyzed to determine how each site differs in chemical composition. The chemical data from each site will then be compared to the corresponding biological data to determine any relationships between the two data sets. ICP-MS will also be conducted on water samples from each site, and the same comparison will be done with its corresponding biological data. The environmental conditions at each site were recorded, some of which included vegetation type, sunlight access, pH, and water temperature. These conditions will also be compared to the biological data to observe any relationships between those data sets. Once both the chemical-biological and environmental-biological sets have been compared, if the chemical-biological data shows the greatest relationship, the hypothesis that chemical composition had the greatest impact on microbial community structure and function will be supported.

## Timeline

This project will begin at the start of the Fall 2024 semester and will continue until the end of the semester. The first few weeks of the semester will be spent reading literature to develop a plan on how to conduct ICP-MS on the water samples. ICP-MS data for the sediment samples has already been collected, and data for the water samples should be collected within the last few weeks of September. Next, all the ICP-MS data will be analyzed for the following 3-4 weeks and compared to the biological data for the next 2-3 weeks. The environmental data will then be analyzed and compared to the biological data for the next 3-4 weeks. A comparison of the chemical-biological and environmental-biological relationships will then be conducted. For the final few weeks, a report on the findings of this research will be written, as well as a poster summarizing the results. The poster will then be presented at the TRU Undergraduate Research and innovation Conference in the spring. Anything that doesn't get done during the fall semester will continue into the winter semester until all the goals of this project are complete.