Spatial Variability of Microplastic Concentrations in Idaho River Systems

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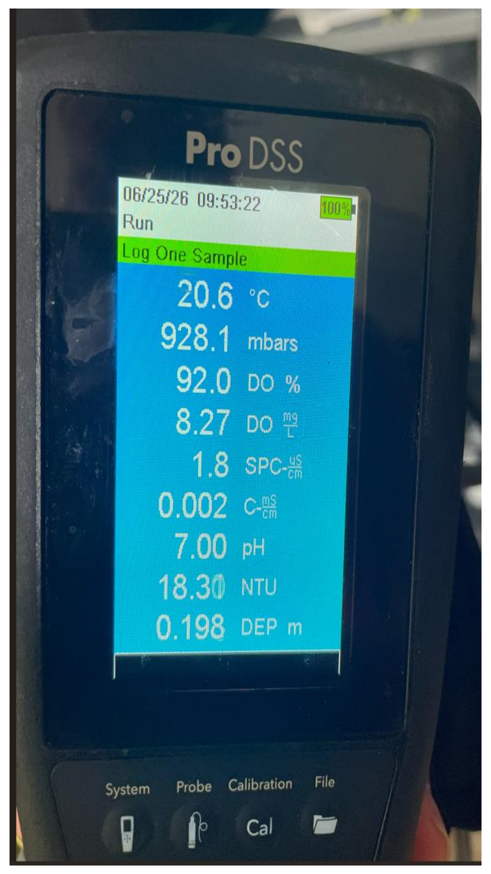
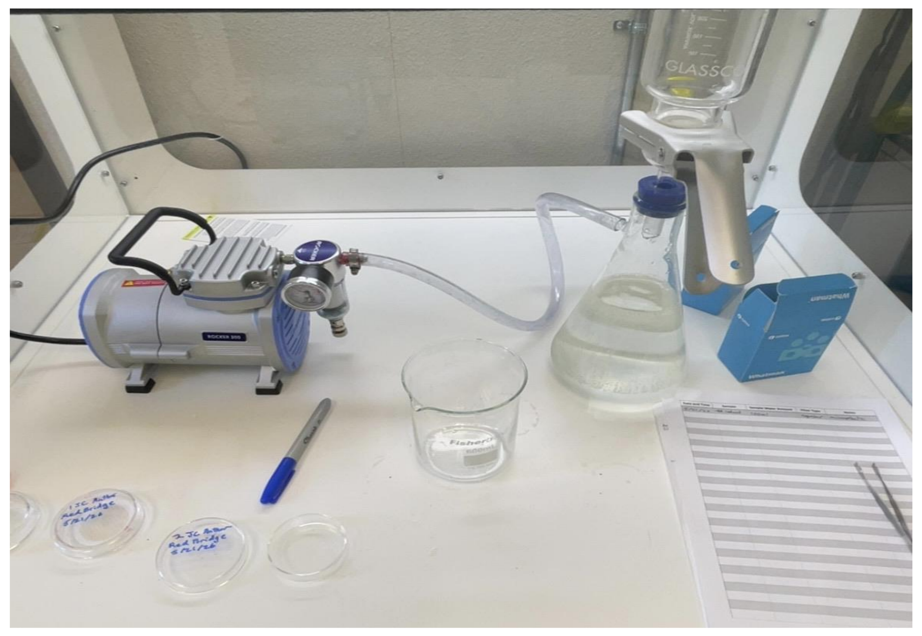
Research Objective

Our research objective is to examine microplastic concentrations and compare them across locations. Additionally, we used blanks as a contamination-control measure and created standardized sampling kits to expand our sampling efforts through community participation while improving consistency across collection sites.

Methods & Materials



Water quality data were collected at five sections of each river using field probes to measure nitrate, phosphate, pH, dissolved oxygen (DO), dissolved oxygen saturation (DO%), turbidity, and temperature. Water samples were collected from bridges using a dip sampling method. A 100–200 mL subsample was vacuum filtered through a cellulose filter to isolate suspended particles. Filters were dried and stored in petri dishes prior to microscopic examination. Cellulose filters were rinsed with deionized (DI) water and transferred to petri dishes. Filters were examined under a light microscope at 40X magnification, and suspected microplastic particles were counted and recorded. Microplastic concentrations were compared among sampling locations and evaluated alongside measured water quality parameters.



Analysis

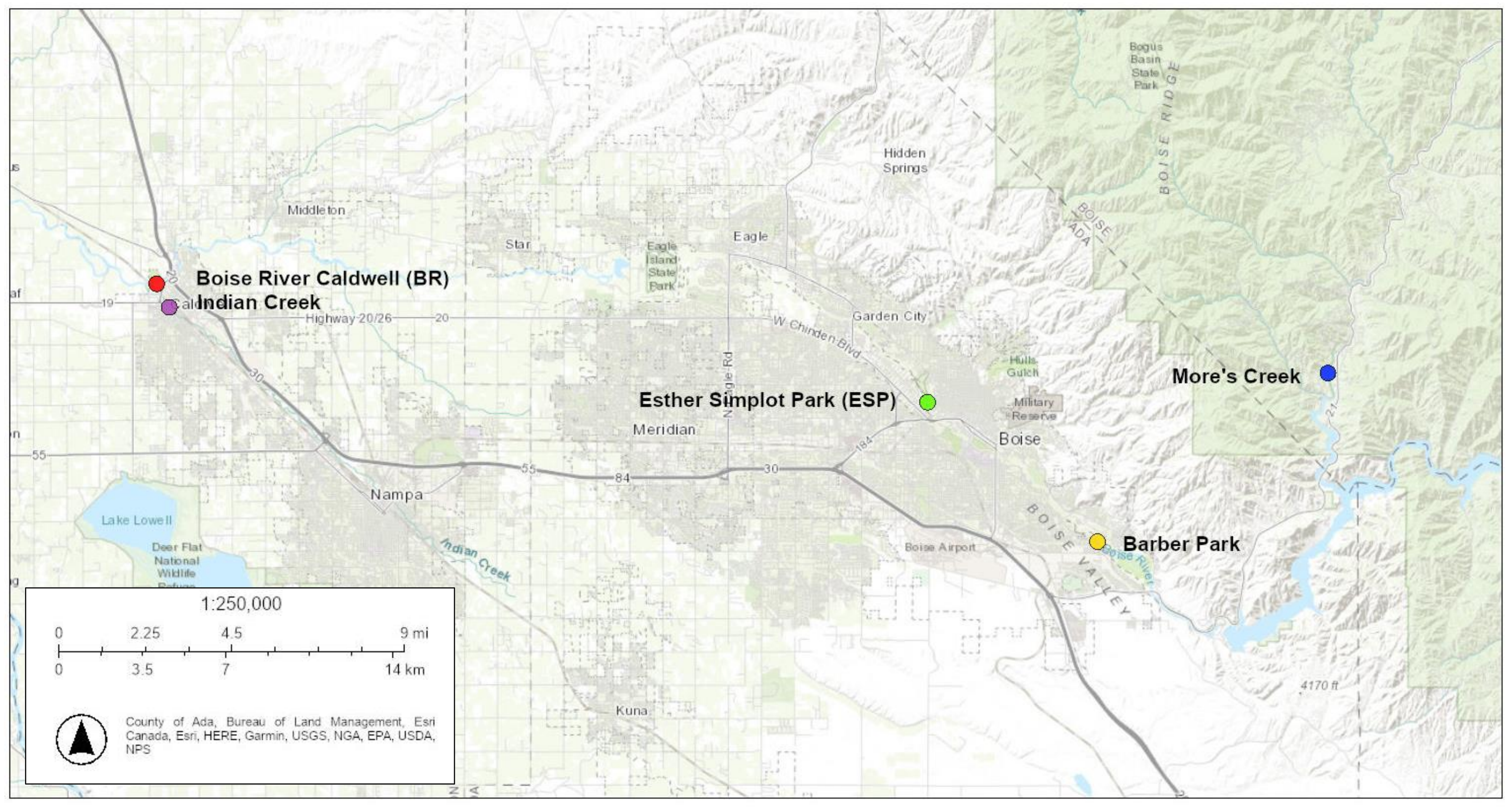
Across all of our Boise River sites, we found a mean of 827 MP/L and a standard deviation of 475 MP/L. The site along the Boise River with the most microplastics on average was Esther Simplot Park in May.
At Indian Creek, there was a mean of 391 MP/L and a standard deviation of 138 MP/L.

Preventative Measures/Control

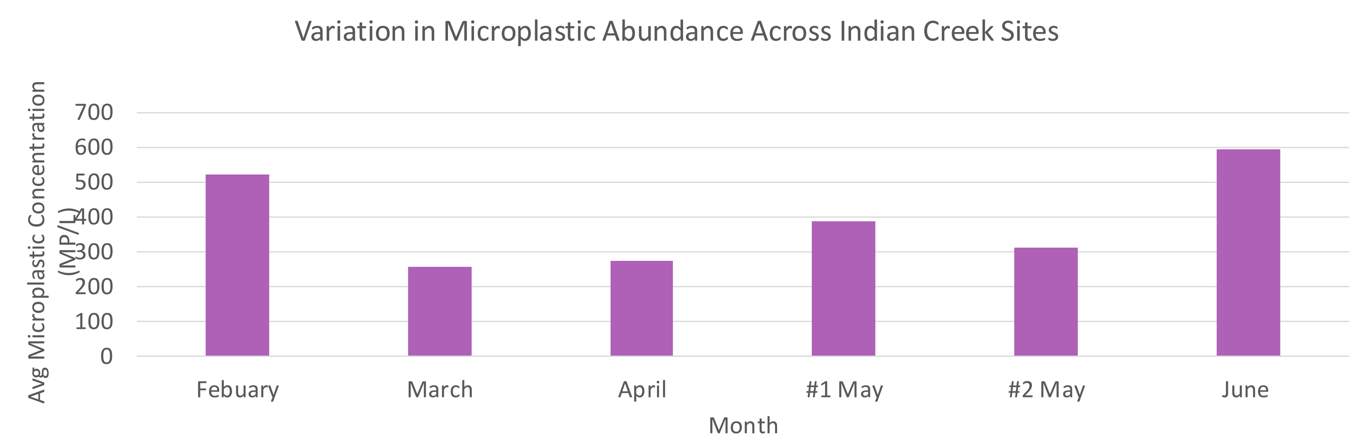
Field blanks were deployed at each sampling site to account for potential airborne contamination and to establish baseline background levels of microplastics.

In addition, laboratory coats were intentionally color-coded (tie-dyed) to help identify and distinguish potential contamination originating from clothing fibers during microscopic analysis. These measures were implemented to improve quality control and reduce the risk of misidentifying procedural contamination as environmental microplastics.

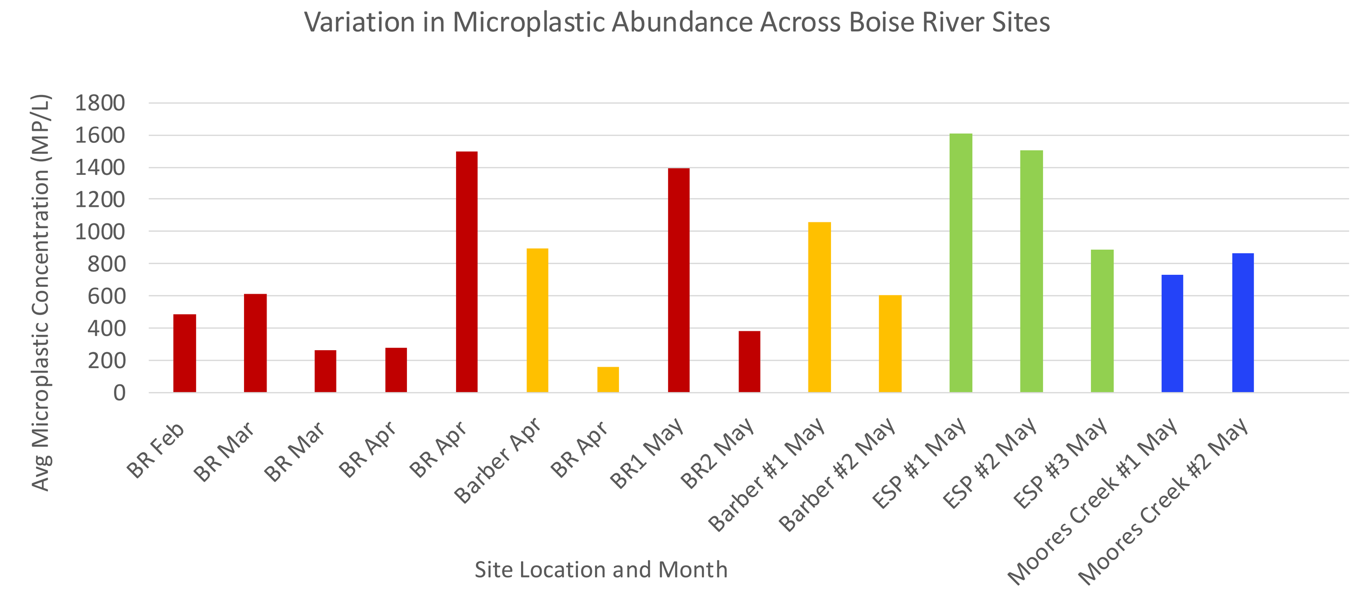
Sampling Sites / Data



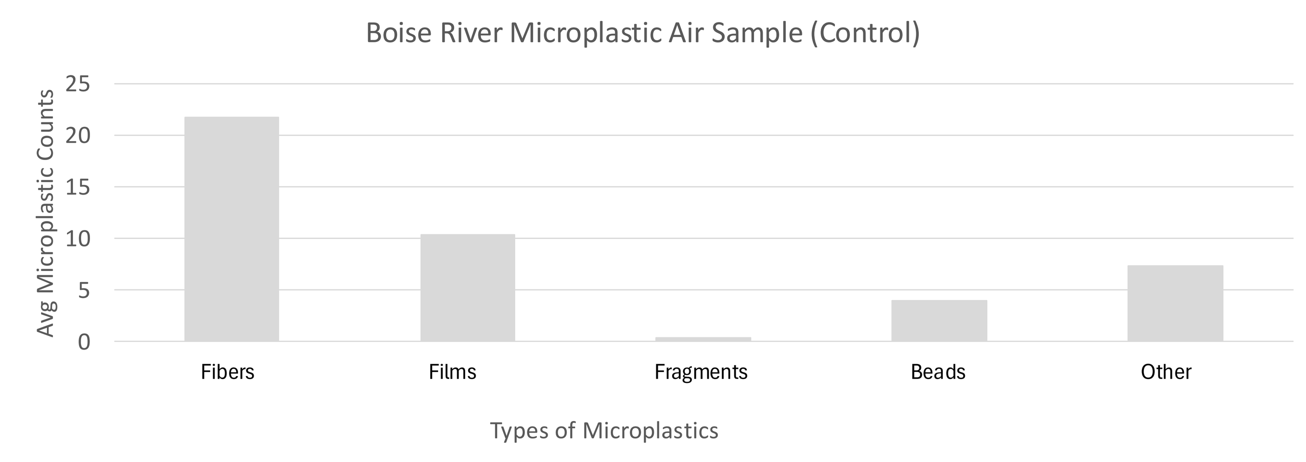
Average microplastic concentration (MP/L) in Indian Creek by month of sample collection. The x-axis represents the monthly sampling period, and the y-axis represents the mean microplastic concentration (MP/L). Bars represent the average concentration for each sampling month.



Average microplastic concentration (MP/L) across Boise River locations by month of sample collection. The x-axis represents the monthly sampling period at each sampling location, and the y-axis represents the mean microplastic concentration (MP/L). Bars represent the average concentration for each sampling month.



Average concentrations of fibers, films, fragments, beads, and other materials (MP/L) in Boise River air sample controls. The x-axis represents the material type, and the y-axis represents the mean microplastic concentration (MP/L). Bars represent the average concentration of each material across all air sample control locations.



Sampling Kits

Community sampling kits were developed for river users to collect water samples and environmental data and return them to the College of Idaho for analysis. The kits enable participants to measure nitrate, phosphate, pH, dissolved oxygen (DO), dissolved oxygen saturation (DO%), turbidity, and temperature, providing an efficient method for expanding data collection across river systems.

A detailed instruction manual was created to guide participants in using the Secchi disk (Image 2), interpreting pH test strips, reading the CHEMets® dissolved oxygen ampoule, and collecting water samples with the sampling flask (Image 1). These standardized protocols help ensure consistent and reliable data collection among community participants.

See QR code for Community Sampling Kit Instructions

Acknowledgements

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