



Ingestion of Microplastics by Macroinvertebrates in Streams in York County, PA as an Indication of Pollution

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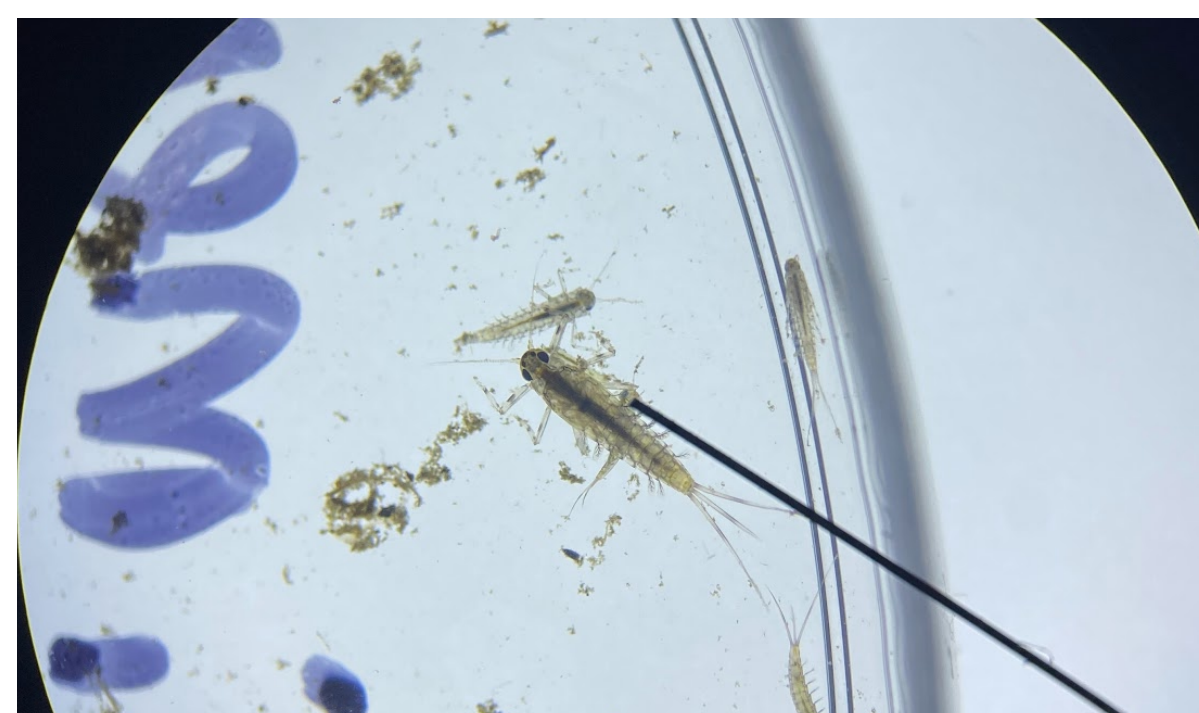
Introduction to microplastics

- Microplastics are pieces of plastic smaller than 5 mm
- Infiltrate waterways and soil
- They can easily be ingested by accident or mistaken for food



Introduction to macroinvertebrates

- Macroinvertebrates are a category of organisms that can be seen by the naked eye but lack a spine
- Have different pollution tolerance levels (good bioindicators)
- Are able to ingest microplastics



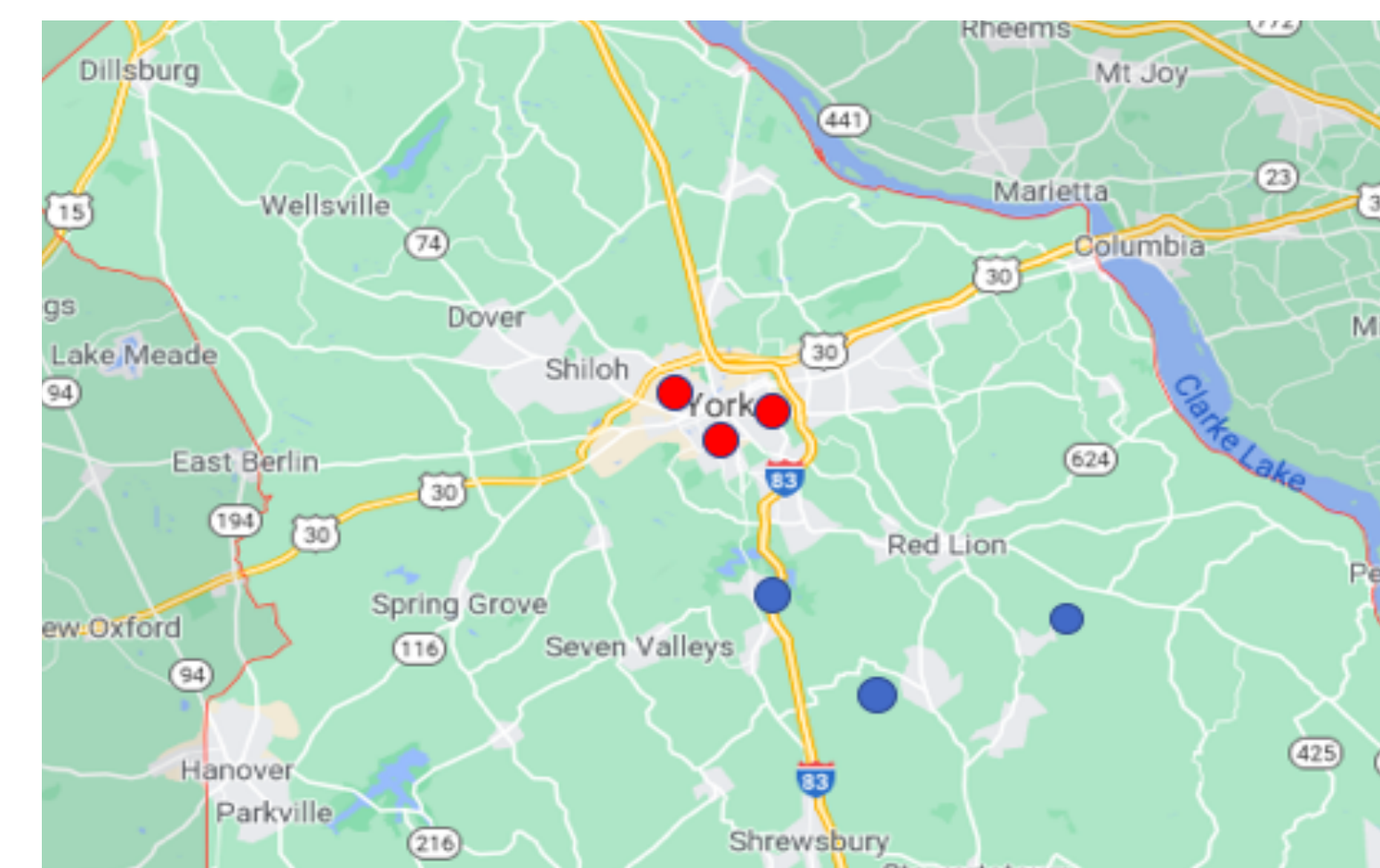
Objective

- Quantify macroplastics found in streams in York County and extract microplastics from macroinvertebrates found in these streams

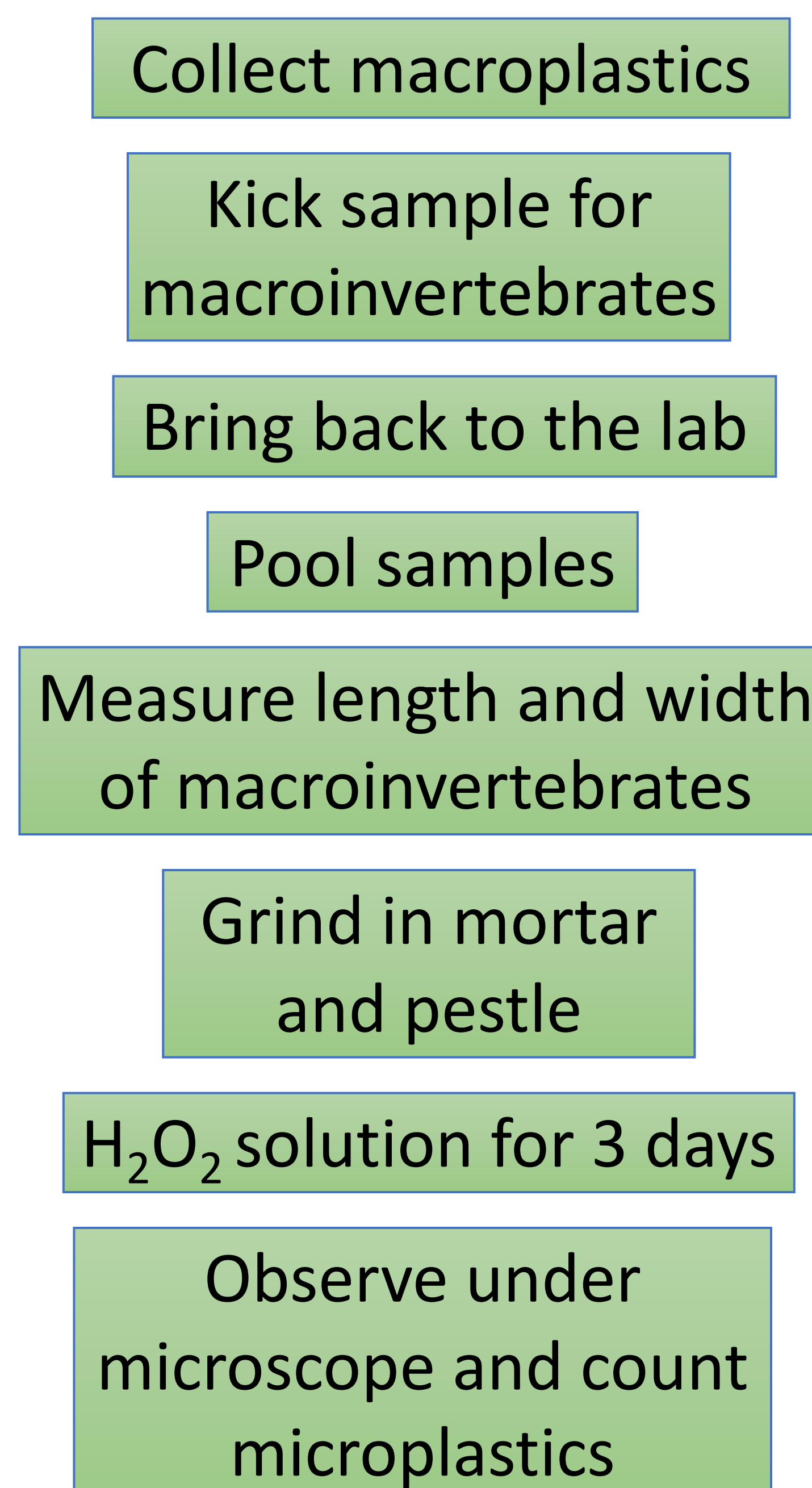
Hypotheses

1. There will be more microplastic particles found in macroinvertebrates that live in streams with more macroplastics
2. There will be more microplastics found in pollution tolerant species over pollution sensitive species of macroinvertebrates.

Methods Flowchart



Map of the study area in York County, PA. Red dots represent urban streams and blue dots represent rural streams.



Results and graphs

Collected Macroplastics



Tyler Run (60 pieces)



Pine Run (4 pieces)

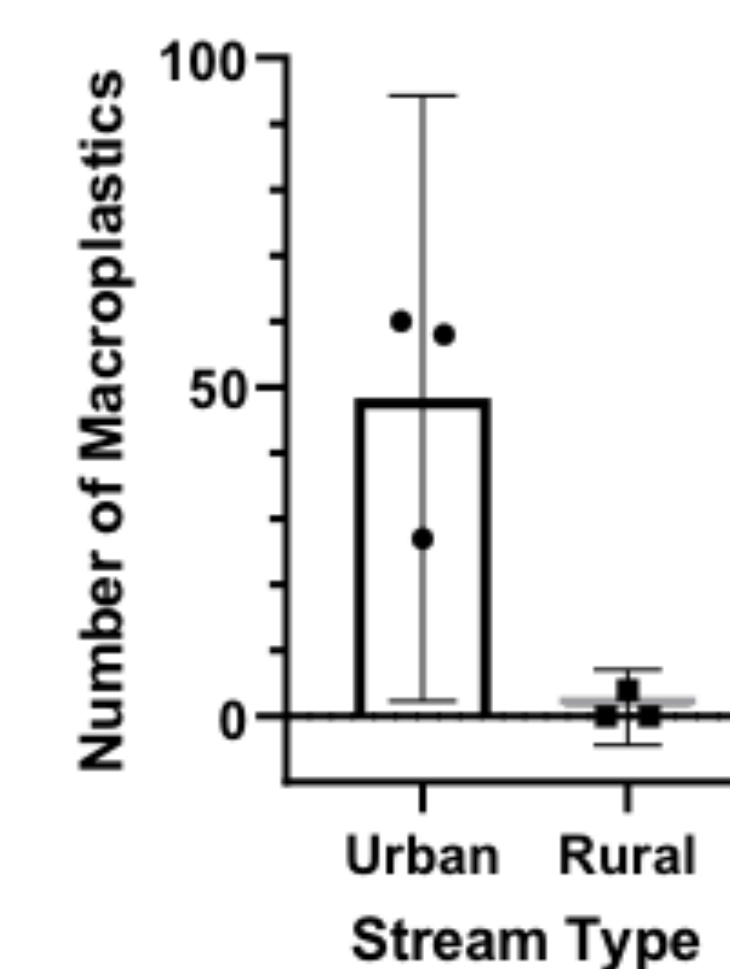


Figure 1. Mean number of macroplastics (± 95% confidence interval) collected from urban (n=3) and rural (n=3) streams in York County, PA. Averages were not significantly different (U=0, P=0.1000).

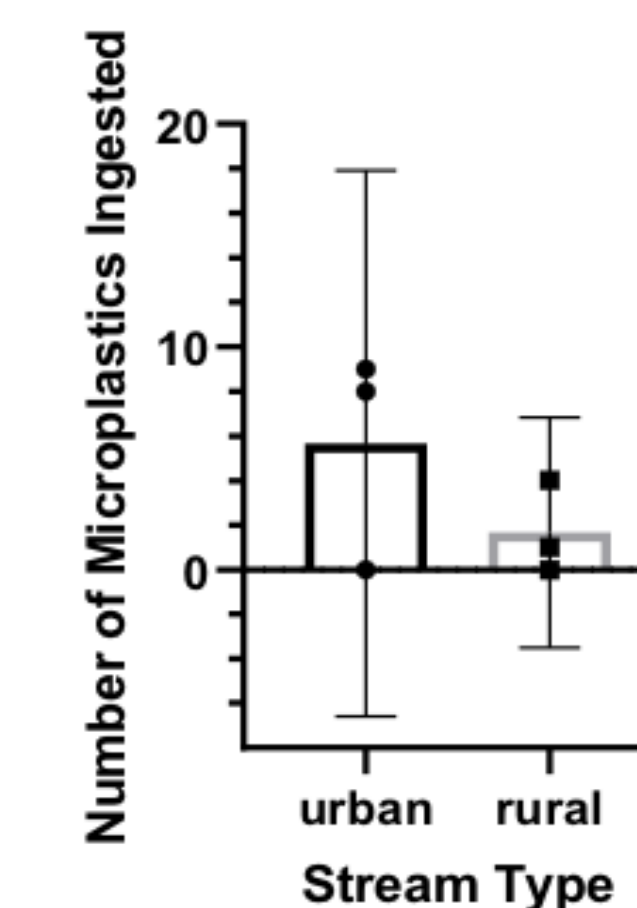


Figure 2. Mean number of microplastics (± 95% confidence interval) ingested by macroinvertebrates collected from urban (n=3) and rural (n=3) streams in York County, PA. Averages were not significantly different (U=2.500, p=0.5000).

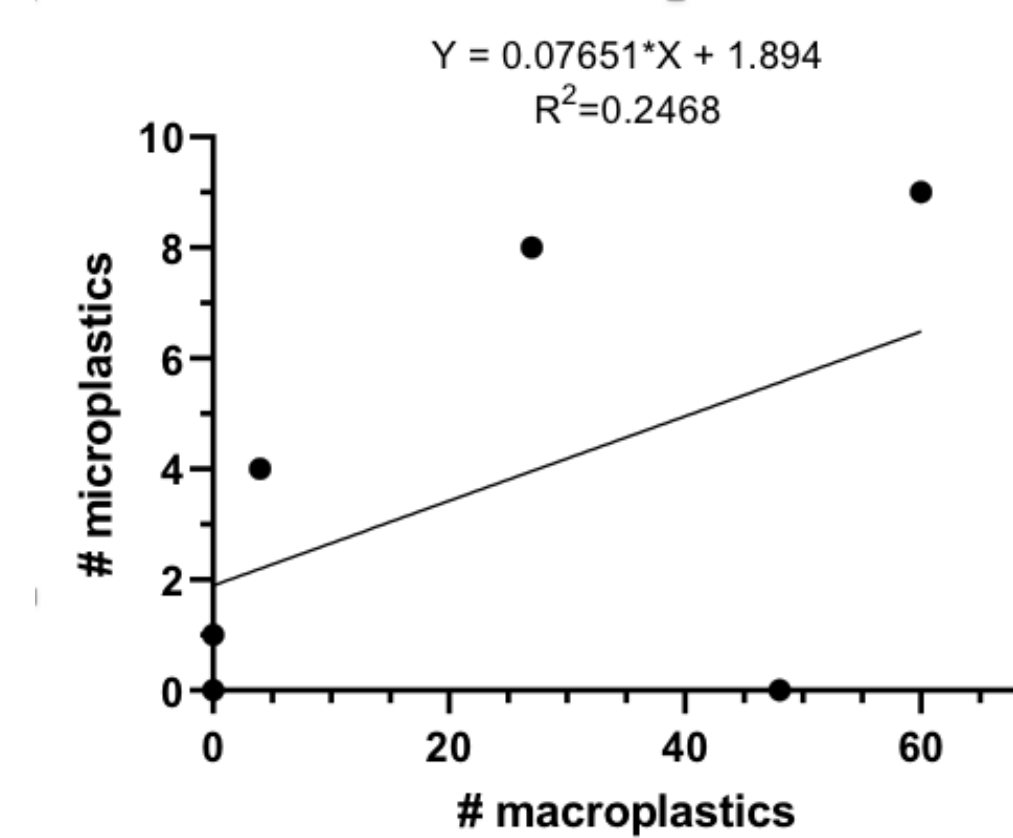


Figure 3. Relationship between the number of microplastics ingested by macroinvertebrates and the number of macroplastics found in each stream (n=6). Linear regression analysis shows a positive slope but is statistically insignificant ($F_{1,4}=1.310$, $p=0.3162$).

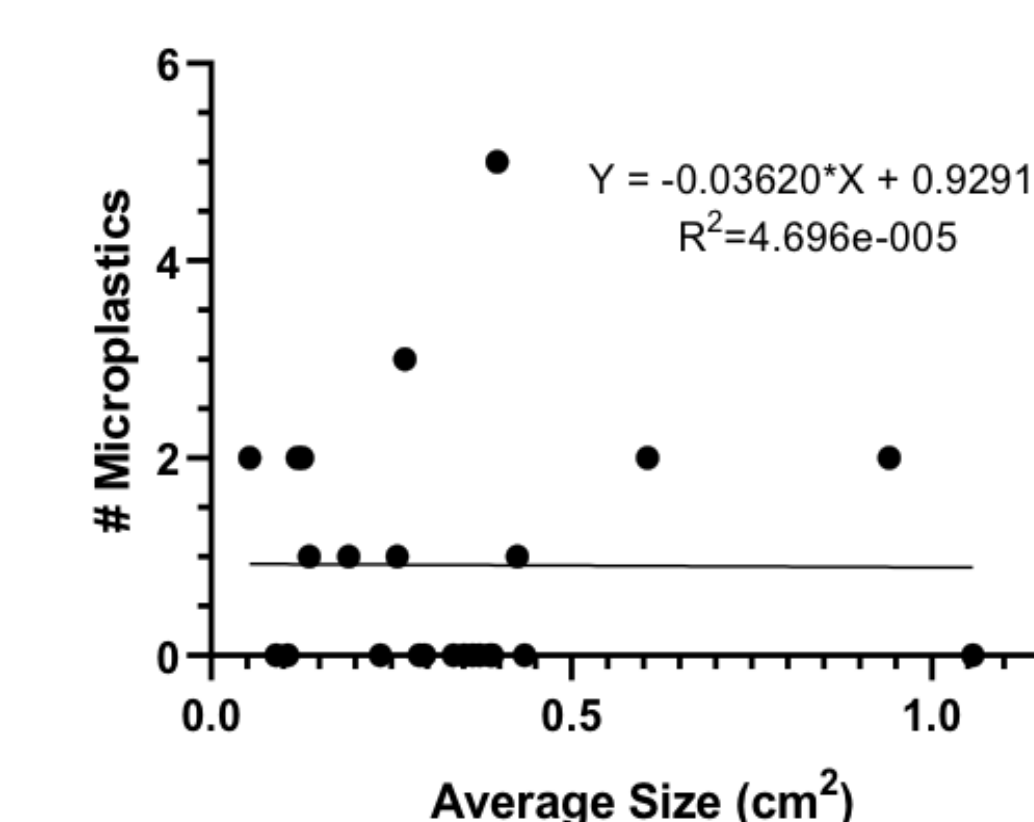


Figure 5. Relationship between number of microplastics ingested and average area of each pooled sample of macroinvertebrates (n=24). Linear regression shows no significant trend ($F_{1,22}=0.001033$, $p=0.9746$).

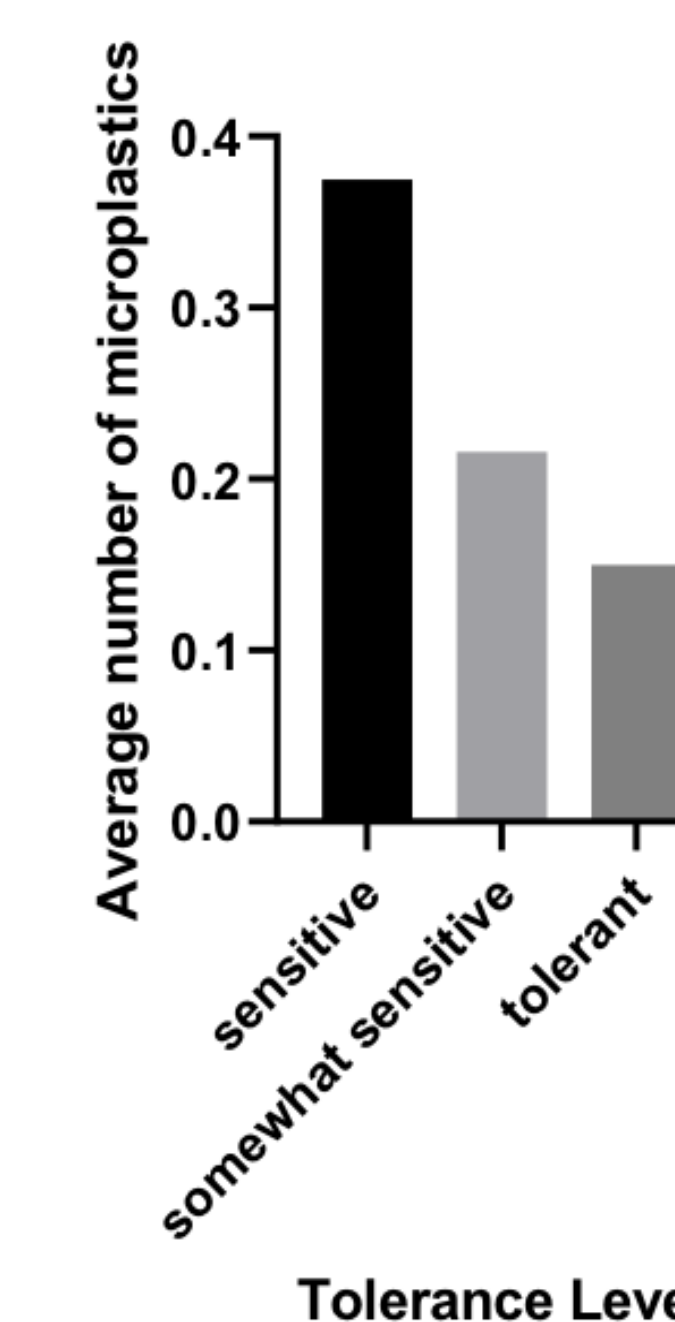


Figure 4. Average number of microplastics ingested by macroinvertebrates based on pollution tolerance level.

Conclusion

- Urban areas are more affected by microplastic pollution
- At the bottom of the food chain, macroinvertebrates are able to ingest microplastics
- Low macroinvertebrate diversity can decrease number of microplastics
- Future studies can focus on how microplastics move up the food chain or expand the study area of this experiment

Sources

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"All research activities in this study follow the Guide for the Care and Use of Laboratory Animals (National Academies Press, 2011)."