THE UNIVERSITY OF ALABAMA IN HUNTSVILLE | COLLEGE OF SCIENCE

Honors Capstone Research (HCR)
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A Baseline Survey of Meiofauna from the Paint Rock River, Northern Alabama

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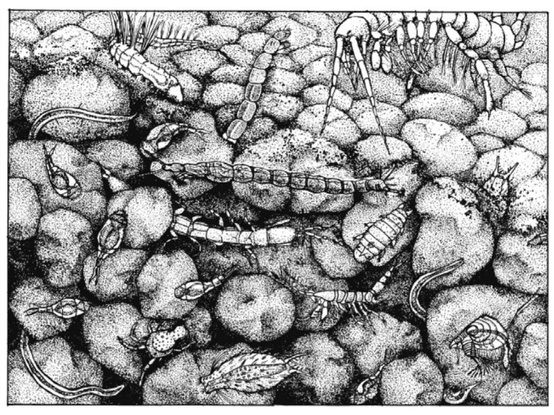
Introduction

- **Meiofauna:** Small benthic invertebrates
  - ~ Decomposition - breakdown of dead matter
  - ~ Trophic link - between bacteria and macrofauna
  - ~ Bioturbation - alter sediment structure
- **Paint Rock River:** TN River tributary
  - ~ High aquatic biodiversity - mussels & fish
  - ~ Jackson County - low human disturbance
  - ~ Fern Cave - endangered gray bat

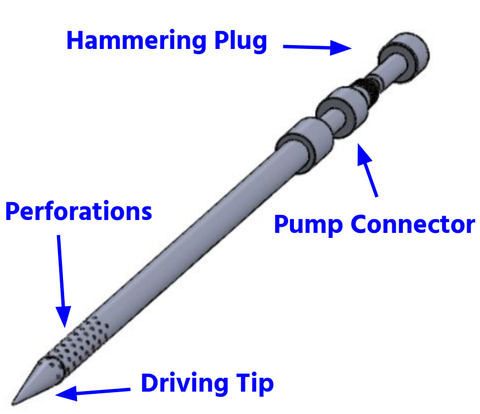
What meiofauna taxa can be found from the river, and how does their community composition change across location and depth?



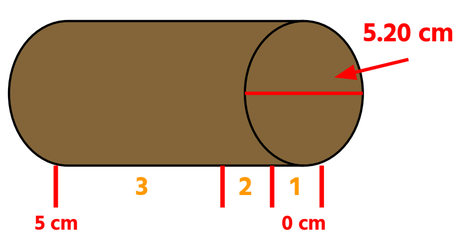
Methods

- **Sampling:** 4 collection sites, 2 visits
  - ~ Environmental probe
  - ~ Epigean eDNA samples
  - ~ Sediment cores (split 0-1 cm, 1-2 cm, 2-5 cm)
  - ~ Bou-Rouch pump - Groundwater eDNA samples
- **Processing:** 72 total sediment samples
  - ~ Fixed in 70% ethanol and stained with rose bengal
  - ~ Sieve series filtered 75 µm < sediment < 2 mm
  - ~ Extracted via decantation through 37 µm sieve
  - ~ Meiofauna identified under dissecting microscope

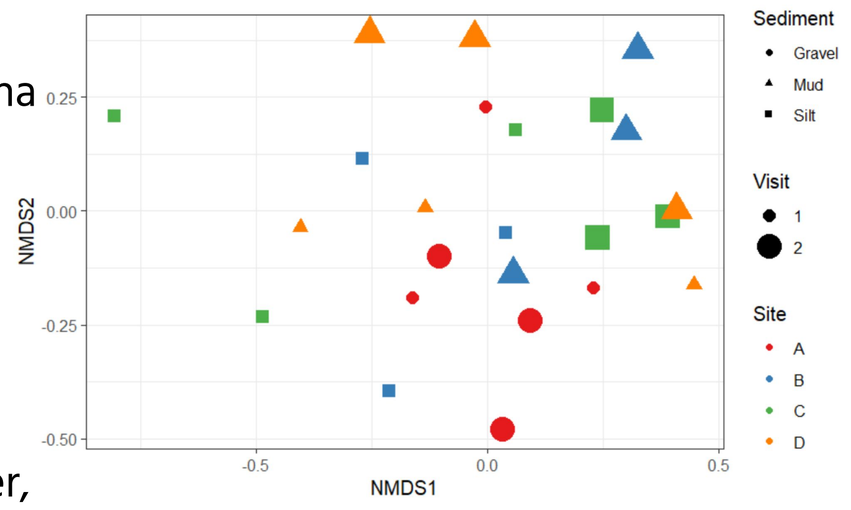
Bou-Rouch Pump



Sediment Core

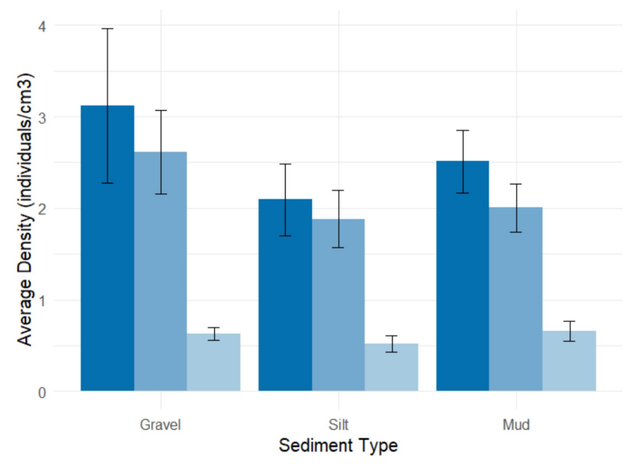


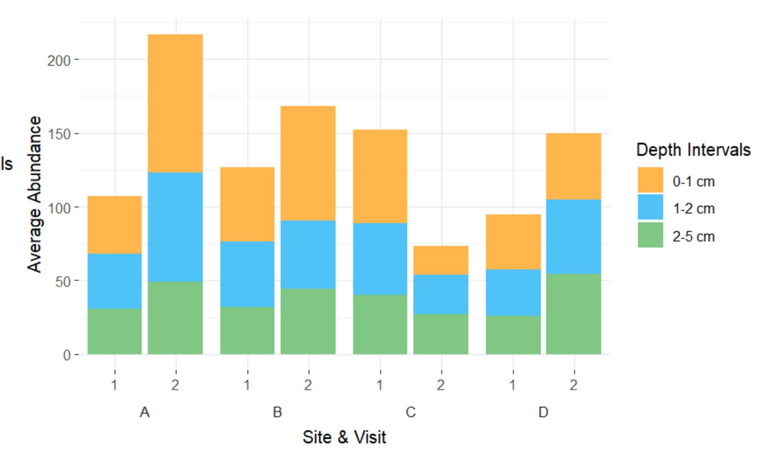
Results & Discussion



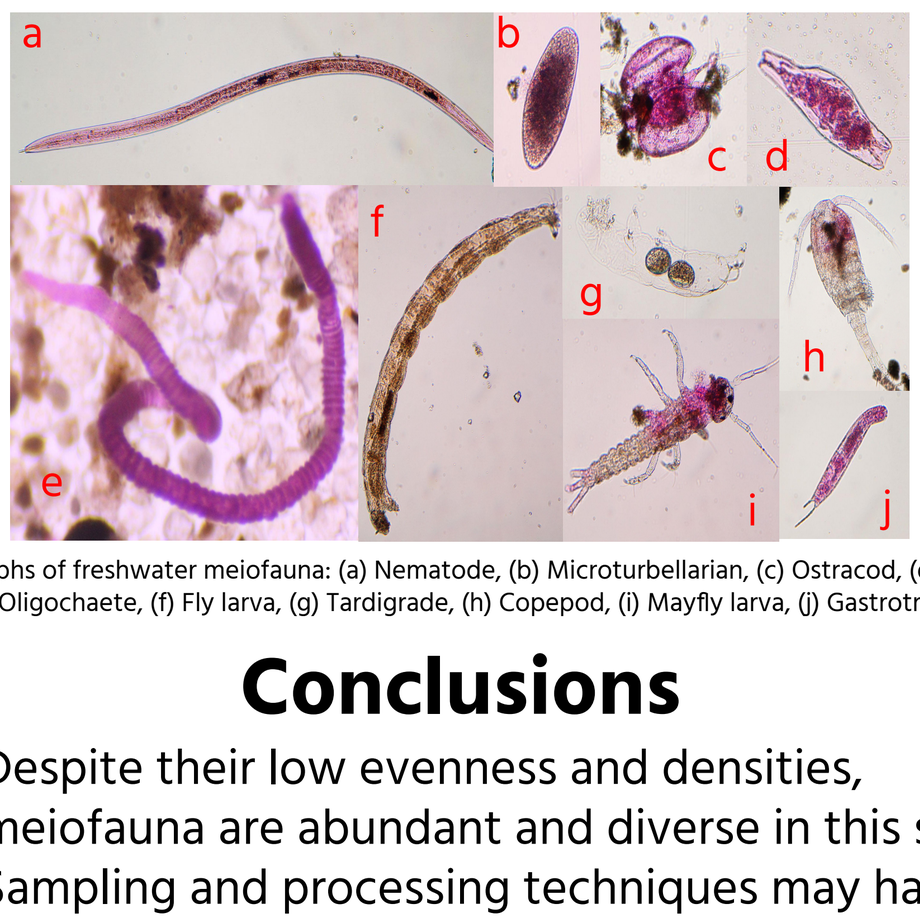
Taxon	Total Count	% of Total	Average Abundance per Sample	Average Density per Sample
Rotifera	1035	31.66%	14.38 ± 1.619	0.541 ± 0.086
Nematoda	995	30.44%	13.82 ± 2.137	0.530 ± 0.105
Diptera	709	21.69%	9.847 ± 2.754	0.386 ± 0.130
Turbellaria	236	7.22%	3.278 ± 0.802	0.117 ± 0.030
Oligochaeta	78	2.39%	1.083 ± 0.418	0.044 ± 0.019
Bivalvia	62	1.90%	0.861 ± 0.621	0.036 ± 0.029
Copepoda	60	1.84%	0.833 ± 0.463	0.037 ± 0.022
Ostracoda	41	1.25%	0.569 ± 0.222	0.022 ± 0.009
Hydrachnidia	12	0.37%	0.167 ± 0.088	0.007 ± 0.004
Isopoda	9	0.28%	0.125 ± 0.111	0.005 ± 0.005
Hydridae	7	0.21%	0.097 ± 0.080	0.004 ± 0.003
Cladocera	6	0.18%	0.083 ± 0.065	0.003 ± 0.003
Amphipoda	3	0.09%	0.042 ± 0.047	0.002 ± 0.002
Coleoptera	3	0.09%	0.042 ± 0.047	0.002 ± 0.002
Nauplii	3	0.09%	0.042 ± 0.062	0.002 ± 0.003
Tardigrada	3	0.09%	0.042 ± 0.047	0.002 ± 0.002
Collembola	2	0.06%	0.028 ± 0.039	0.001 ± 0.001
Ephemeroptera	2	0.06%	0.028 ± 0.039	0.001 ± 0.001
Gastropoda	2	0.06%	0.028 ± 0.039	0.001 ± 0.001
Gastrotricha	1	0.03%	0.014 ± 0.028	0.001 ± 0.001
Total	**3269**	**100.00%**	**45.40 ± 5.845**	**1.739 ± 0.312**

Identified 3,269 individuals from 20 taxa across 9 phyla
Samples were dominated by rotifera, nematoda, and diptera
Weak similarities between samples of shared site or visit





Density decreased with depth across all sediment types
Abundance was variable between sites and visits
Greatest changes in abundance were in the shallowest core layers



Photographs of freshwater meiofauna: (a) Nematode, (b) Microturbellarian, (c) Ostracod, (d) Rotifer, (e) Oligochaete, (f) Fly larva, (g) Tardigrade, (h) Copepod, (i) Mayfly larva, (j) Gastrotrich.

Conclusions

- Despite their low evenness and densities, meiofauna are abundant and diverse in this system.
- Sampling and processing techniques may have underrepresented certain taxa.
- Future work: Process eDNA samples for metabarcoding, machine Bou-Rouch pump.

Acknowledgements

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