

Anna's Bugs





# INVISIBLE STRING



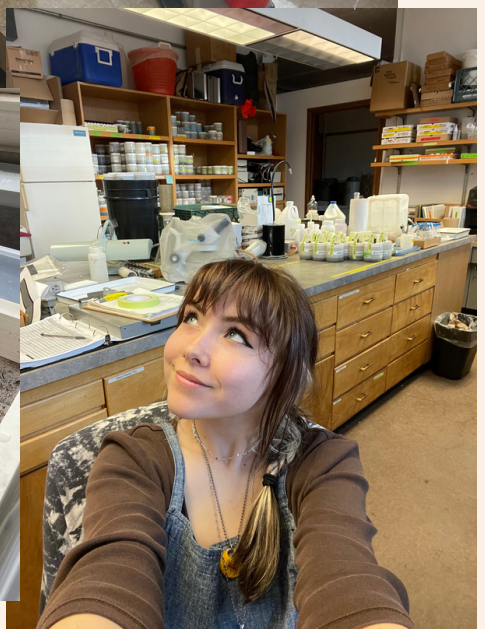
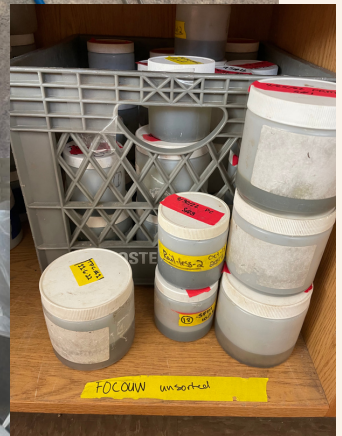


# BUG COLLECTING

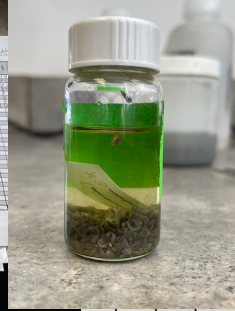




# IN THE LAB

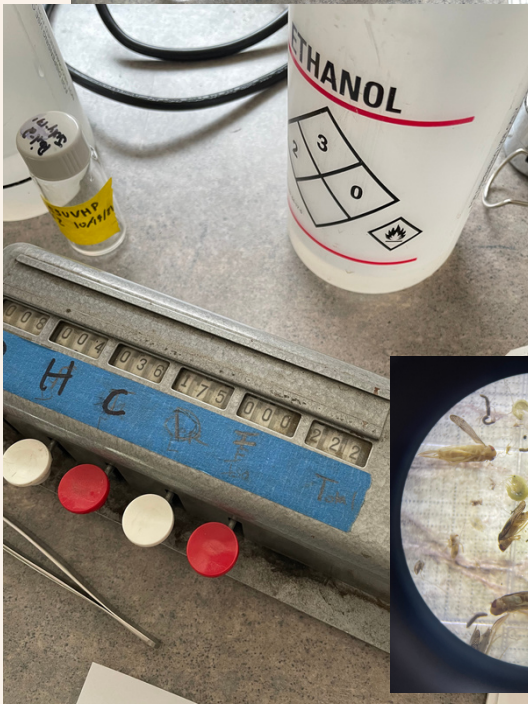






3/21/23 Initials: AT  
 1/6/22 Page \_\_\_ of \_\_\_

Count	Sample #	Box	Cell	Notes (index)
567	3	2	F4	
130	3	2	F5	
146	3	2	F6	
442	3	2	F7	
3	3	2	G7	
389	3	2	F6	
144	3	2	F6	
4	3	2	F8	2 <sup>o</sup>
2	3	2	G8	
1	3	2	F6	
8	3	2	F6	
3	3	2	F6	
1	3	2	F6	
2	3	2	F6	





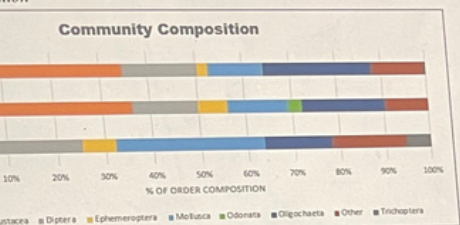
# ANALYSIS

Ecologica x agenda x Google C x Calendar x Google E x A - Poste x Intro

Search (Option + Q)

File Edit View Help

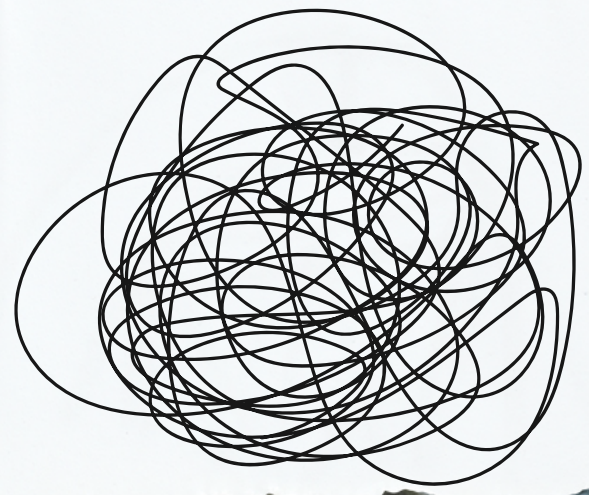
findings to other canal and ditch systems in different geographic regions



indicate that the community composition of macroinvertebrates across the sites demonstrate different patterns, with streams and ponds exhibiting similar composition, while the composition canals/ditches

her emphasizes the complex nature of the relationship between habitat type and macroinvertebrate communities. The high density of macroinvertebrates observed in canals/ditches could be due to the high levels of nutrients and organic matter in these habitats, which support a larger number of organisms (source?).

often receive nutrient-rich runoff from agricultural or urban areas, which can lead to high levels of primary production and subsequently support a greater number of macroinvertebrates (source?). In addition, the physical characteristics of canals/ditches, such as their typically wide and deep channels, can create a habitat with a large amount of available space to support high densities of organisms (source?). This larger space may also allow for the presence of a greater number of species, each occupying a different niche within the ecosystem (source?).



MacBook Pro

is we

# 3 4 5 6 7 8

E R T Y U

D F G H J

total.ind	pres.ab	site type	Site	Sum of pres.ab
0	0	pond	Avery's Pond	1
0	0	pond	College Lake Inlet	5
0	0	pond	CSU Veterinary Pond	10
0	0	pond	Ditch @ Avery Park	5
0	0	pond	Dixon Canyon Lateral	14
0	0	pond	Homestead Natural Area Pond	9
0	0	pond	Mail Creek Ditch Pond	8
0	0	pond	Micklary Natural Area Pond East	12
0	1	pond	New Mercer Canal @ Elizabeth	4
0	0	pond	New Mercer Canal @ Meadowlark	4
0	0	pond	Pateros Creek	7
0	0	pond	Poudre River at Wood St.	8
0	0	pond	PR @ CSU Environmental Learning Center	13
0	0	pond	Spring Creek @ Centre Ave	7
0	0	pond	Spring Creek @ Roland Moore	11
0	0	pond	Spring Park Pond	10
0	0	pond	Trouman Park Creek	7
0	0	pond	Two Creeks Natural Area	8
0	0	pond	Grand Total	143

Notes on yellow paper:

Non-exhaustive probability

Chlorophyll  $a+b$  ecology course

Paper from last year to Garcia

Chlorophyll  $a+b$  ecology course

Personal question whether water int ~ age other than int ~ age

SE =  $\frac{SD}{\sqrt{n}}$

Statistical Analysis

Streams Ponds

Notes on spiral notebook:

Sites

ponds streams canals

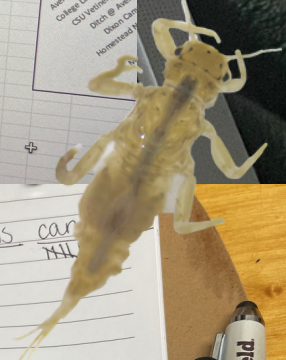
lake

- aphid instead of trichopteran
- trichopteran = no life stages
- NMDS richness
- taxa across different types

mean, SE 1st pivot table summary then means

density = total individual / sites

std  $\rightarrow SE = \frac{SD}{\sqrt{n}}$



Smithfield



# PRESENTING

## CELEBRATING UNDERGRADUATE RESEARCH CELEBRATION!!

**239**

**AQUATIC MACROINVERTEBRATE COMMUNITY IN URBAN WATERS OF FORT COLLINS, CO**  
Anna Hall, Caitlin Stevens, Fernando Carvalho, Prof. Dan Preston  
Department of Fish, Wildlife, and Conservation Biology &  
Department of Ecosystem Science and Sustainability

**Introduction**  
Continued urban development threatens biodiversity levels of anthropogenic ecosystems. Urban blue spaces, such as ponds, streams, and ditches/canals, harbor various aquatic macroinvertebrates that are vital for preserving biodiversity. Ponds experience less connectivity between water bodies, while streams and ditches/canals experience more connectivity.

**Results**  
**Community Composition**

Order	Percentage
Trichoptera	~15%
Chironomidae	~15%
Collembola	~10%
Hydracarina	~10%
Rotifera	~10%
Amphipoda	~10%
Crustacea	~10%
Other	~10%
Unidentified	~10%

**Discussion**  
**DENSITY** (Figure 3a): Canals/ditches saw highest density likely due to the collection of nutrients from urban runoff, and resiliency to anthropogenic industrialization. Lower density in ponds could be linked to lower oxygen levels and disconnection to alternate ecosystems.

**TAXONOMIC RICHNESS** (Figure 3b): All habitat types saw similar taxonomic richness which may be due to human disturbance. Canals/ditches are often in urban or agricultural landscapes, where they may be subject to pollution, nutrient enrichment, and physical alterations such as dredging or bank stabilization.

**COMPOSITION** (Figure 3c): Streams and ponds exhibited similar community composition, while canals/ditches differed slightly, possibly due to the presence of more tolerant species.

**Conclusions**  
• Urban runoff and man-made structures likely play important roles in shaping aquatic habitats, boosting certain order persistence and hindering others.  
• Urban aquatic macroinvertebrate habitats can establish resilient, bio-diverse ecosystems.  
• Further research that takes into account landcover variables and more organisms can help shed light on mechanisms driving these patterns.

**Acknowledgments**  
SUSP • Prof. Stacy Livert • Sean Geer • Preston Lab

**Literature Cited**  
Cahoon, L. A., & Turner, L. R. (2009). Urbanization and the loss of biodiversity in aquatic ecosystems. *Journal of the North American Benthological Society*, 28(1), 1-14.  
Preston, M. J. (1995). The species-area relationship. *Journal of Animal Ecology*, 64(1), 1-27.



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Bugs R Cool