

## Introduction

Aquatic macroinvertebrates that live on, under, and around rocks and sediments at the bottom of streams are critically important to the function of many ecosystems throughout the world. Many of these species are known to be sensitive to water quality, and can only survive in areas that are relatively free of pollution. In order to assess the water quality and diversity of macroinvertebrates, we collected specimens on the stretch of Copeland Creek that bisects the Sonoma State University campus, and compared them with specimens collected in previous years. After identifying these specimens, we assessed the species diversity and pollution tolerance in Copeland Creek. These data will be useful in better understanding factors that determine the community structure of aquatic macroinvertebrates under different environmental conditions.

## Materials & Methods

In April, 2019, we collected aquatic macroinvertebrates from a permanent pool in the stretch of Copeland Creek that bisects the SSU campus (Figure 1). Macroinvertebrates were also collected at this location in 2017 and 2018 by students in Entomology (BIOL 323) and Field Biology (314).



Figure 1: Sampling location in Copeland Creek (marked in red) on the Sonoma State University campus

We captured samples by placing a net into the creek, and then brushing rocks and creek sediment to dislodge invertebrates from the substrate (Figure 2). We preserved specimens in 70% ethanol, and sorted and identified them in the lab. We then compared our samples to those collected in 2017 to 2018 to assess taxonomic diversity and pollution tolerance.



Figure 2: Diana Gonzalez and Nayeli Lozano collecting aquatic macroinvertebrates in Copeland Creek.

## Results

We collected samples from 6 discrete taxonomic groups, with a mean pollution tolerance rating of 2. In 2017, students collected samples from 12 discrete taxonomic groups, with a mean pollution tolerance rating of 2.8. In 2018, students collected samples from 20 discrete taxonomic groups, with a mean pollution tolerance rating of 3.5.

Common Name	Taxonomic Group	Pollution Tolerance	2017	2018	2019
Dobsonflies	Neuroptera: Corydalidae	0	✓	✓	
Caddisflies	Trichoptera: Odontoceridae	0			✓
Stoneflies	Plecoptera: Perlidae	1		✓	
Caddisflies	Trichoptera: Brachycentridae	1		✓	
Spiny crawler mayflies	Ephemeroptera: Ephemerellidae	1	✓	✓	✓
Stoneflies	Plecoptera: Perlodidae	2	✓	✓	✓
Caddisflies	Trichoptera: Rhyacophilidae	2	✓		
Mayflies	Ephemeroptera: Paraleptophebia	2		✓	
Prong-gilled Mayflies	Ephemeroptera: Leptophlebiidae	2		✓	✓
Annelid worms	Lumbricidae	3		✓	
Mayflies	Ephemeroptera: Ameletidae	3	✓		✓
Flatworm	Turbellaria	4		✓	
Scud	Amphipoda	4	✓	✓	
Caddisflies	Trichoptera: Hydropsychidae	4	✓	✓	
Mayflies	Ephemeroptera: Heptageniidae	4	✓	✓	
Mayflies	Ephemeroptera: Baetidae	4	✓	✓	
Crayfish	Astacoidea	5			
Predaceous diving beetles	Coleoptera: Dytiscidae	5	✓	✓	
Water scavenger beetles	Coleoptera: Hydrophilidae	5		✓	
Creeping water bugs	Heteroptera: Naucoridae	5		✓	
Isopods	Armillidiidae	7	✓	✓	
Crawling water beetle	Coleoptera: Haliplidae	7			
Horsehair worm	Gordiidae	8		✓	
Annelid worms	Oligochaeta	8		✓	
Water Striders	Hemiptera: Gerridae	N/A	✓	✓	✓

Figure 3: Taxonomic groups of macroinvertebrates sampled in Copeland Creek in 2017, 2018, and 2019, along with their pollution tolerance ratings.

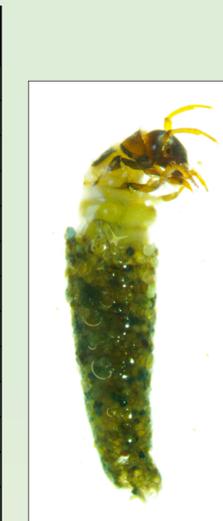


Figure 4: Odontoceridae (strong case) caddisfly (photo: W. St. John)



Figure 5: Heptageniid (flat-headed) mayfly (photo: W. St. John)



Figure 6: Isopod (photo: W. St. John)



Figure 7: *Drunella flavilinea*, spiny crawler mayfly (photo: W. St. John)

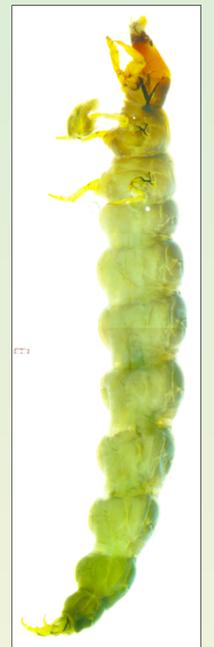
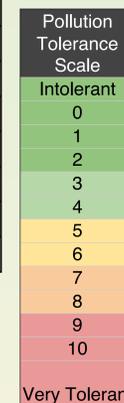


Figure 9: Rhyacophiid (free living) caddisfly (photo: W. St. John)



Figure 8: Perlodid stonefly (photo: W. St. John)



## Discussion

Many highly pollution intolerant macroinvertebrate species have been found during the three years of sampling in Copeland Creek on the Sonoma State University campus. This suggests that the water quality in this stretch of Copeland Creek is good quality and has been for the past three years. We recommend continued macroinvertebrate sampling as a way of monitoring both water quality and taxonomic diversity on campus. Sampling of different sites throughout the creek could also be useful in determining if water quality and diversity are the consistent throughout the creek, particularly in the areas downstream of campus, where the creek is more channelized and possibly impacted more highly by human development.

## Acknowledgements

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