

# Micro and Macro Invertebrates in Freshwater Guzzlers

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## Introduction

- The Elkhorn Slough is mainly saltwater with only a few seasonal ponds as a source of freshwater
- Guzzlers - man made source of freshwater for terrestrial organisms
  - Conducted study on 3 guzzler sites
- Micro invertebrates - cold blooded organisms too small to be seen with the naked eye and do not have a backbone
- Macro invertebrates - slightly bigger than micro invertebrates and don't require a microscope to be seen
- Testable Question:** Does the species richness and abundance of macro and micro invertebrates change based on the location and water quality of the guzzlers?
- Hypothesis:** We believe we would find a higher species richness and abundance in a guzzler site containing water quality that is balanced, as well as a combination of both shade and sun



(Photo by: Olivia Gurnee)

Fresh20 Group: Jacqueline Rodríguez-Rivera, Jasmín Juárez-González, Karina Moreno, Edmundo Luna-Díaz and Ángel García-López

## Discussion

- Possible relationship between phosphate levels and the species richness for macro and micro invertebrates but scatter plot shows there is no correlation
  - Phosphates play an important role in all organisms' survival
- No conclusive statistical significance between most of the variables
- Answered our question by seeing how water quality and the species richness and abundance of macro and micro invertebrates changed between guzzlers
  - Answer: While we were there, water quality statistically did not affect the species richness and abundance
- Had a higher species abundance in guzzler #8 because we found scuds feeding off a seed that was in our water sample.
- With more time:
  - Learn more about special behavioral traits and inclinations towards certain conditions that specific macro and micro invertebrates have
  - Learn how water quality affects keystone invertebrate species and the ripple effects in has in the rest of the Elkhorn Slough food web



(Photo by: Jacqueline Rodríguez-Rivera)  
Copepods found in all three guzzler sites



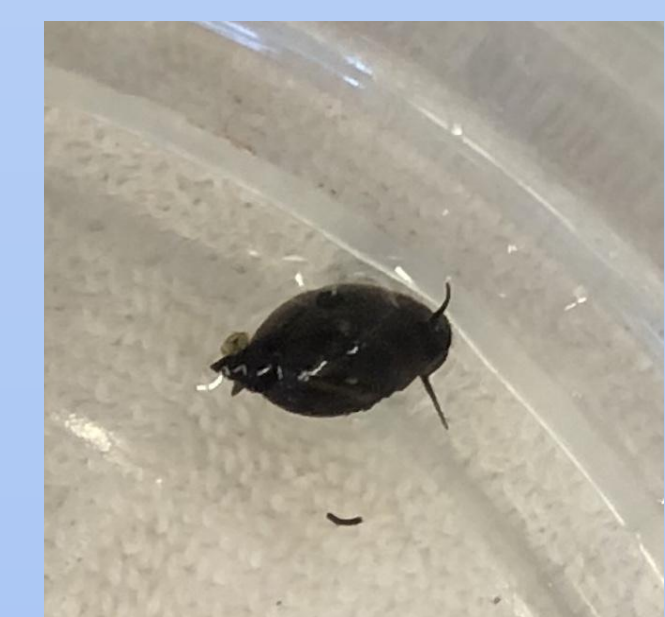
(Photo by: Ángel García-López)  
Scuds found in all three guzzler sites



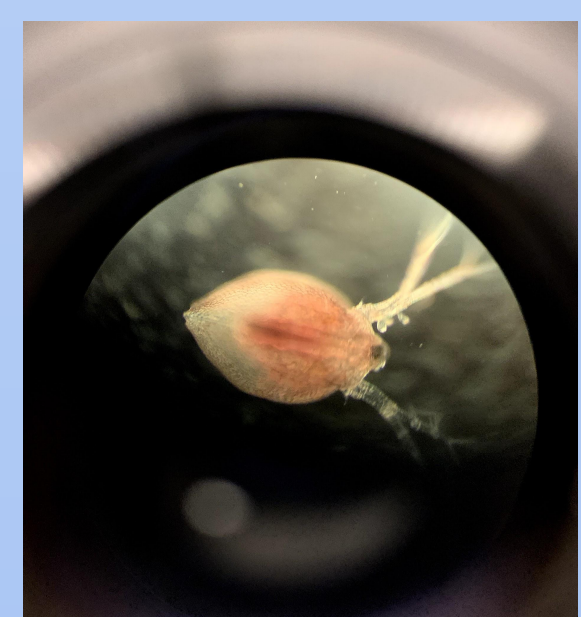
(Photo by: Edmundo Luna)  
Seed that scuds fed off of, found in guzzler #8



(Photo by: Jasmín Juárez-González)  
Mosquito larva found in guzzler sites #5 and #7



(Photo by: Jasmín Juárez-González)  
Pouch snails found in guzzler sites #5 and #7



(Photo by: Ángel García-López)  
Red Daphnia found in guzzler sites #5 and #7



(Photo by: Jacqueline Rodríguez-Rivera)  
Guzzler site #7 was on a small hill, surrounded by a few oak trees



(Photo by: Karina Moreno)  
Guzzler site #8 was out in the open, close to the trail with one big oak tree next to it as well as some poison oak growing around it



(Photo by: Jasmín Juárez-González)  
Guzzler site #5 was covered by oak tree limbs and shrubs, being hardly visible even though it was right next to a trail



(Photo by: Jasmín Juárez-González)  
Guzzler site #8 was out in the open, close to the trail with one big oak tree next to it as well as some poison oak growing around it

## Literature Cited

KidsKconnect (November 12, 2017). Invertebrate Facts & Worksheets. <https://kidskconnect.com/animals/invertebrates/>

Department of Conservation. Freshwater zooplankton. <https://www.doc.govt.nz/nature/native-animals/invertebrates/zooplankton/>

Monterey Bay Aquarium Foundation.(1997). *A Natural History of the Monterey Bay National Marine Sanctuary*. Monterey Bay Aquarium Press.

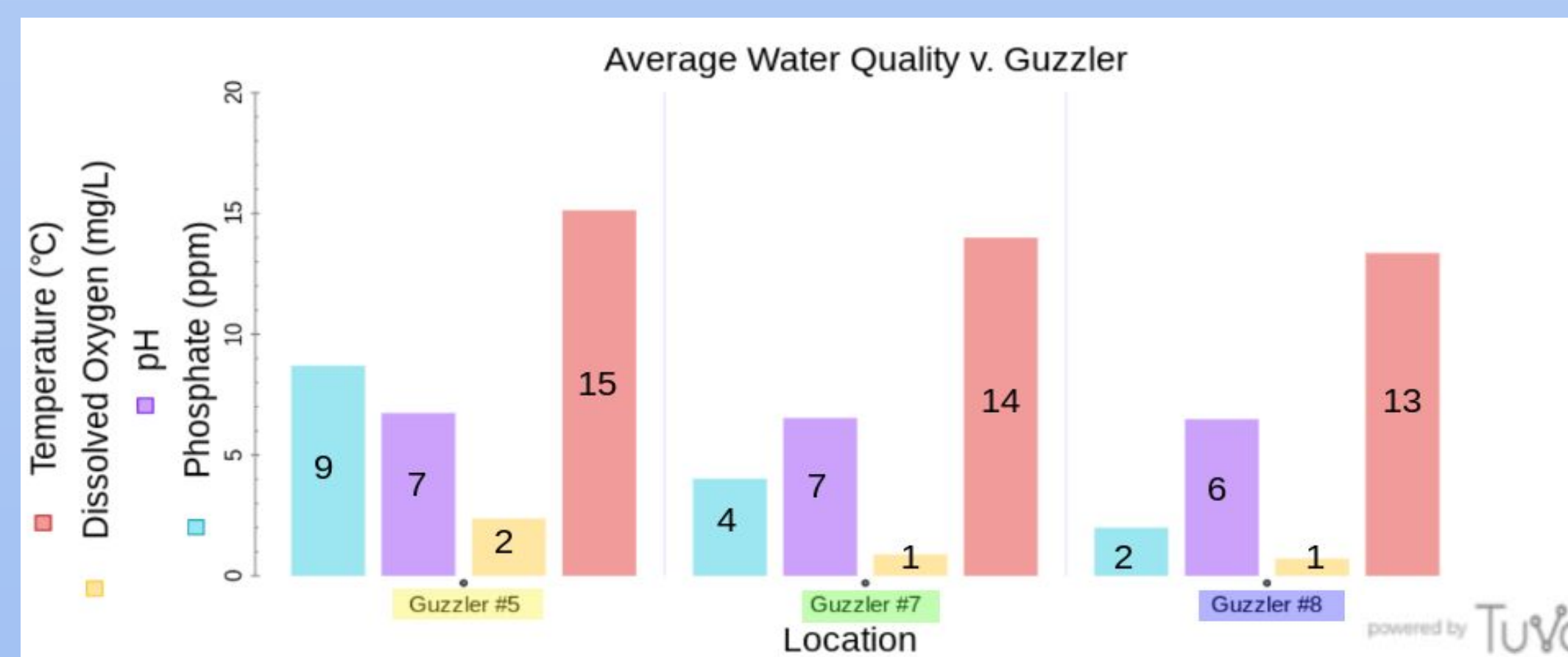
## Acknowledgments

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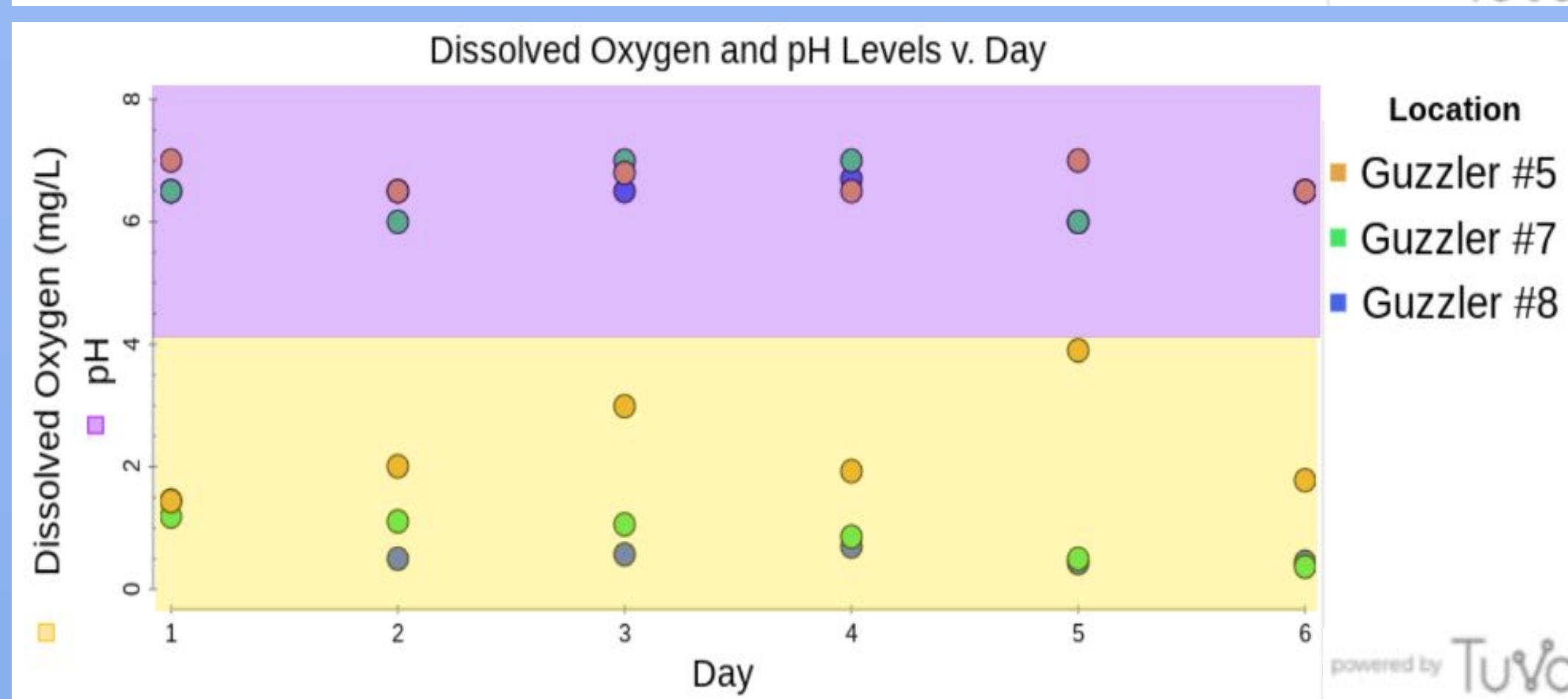
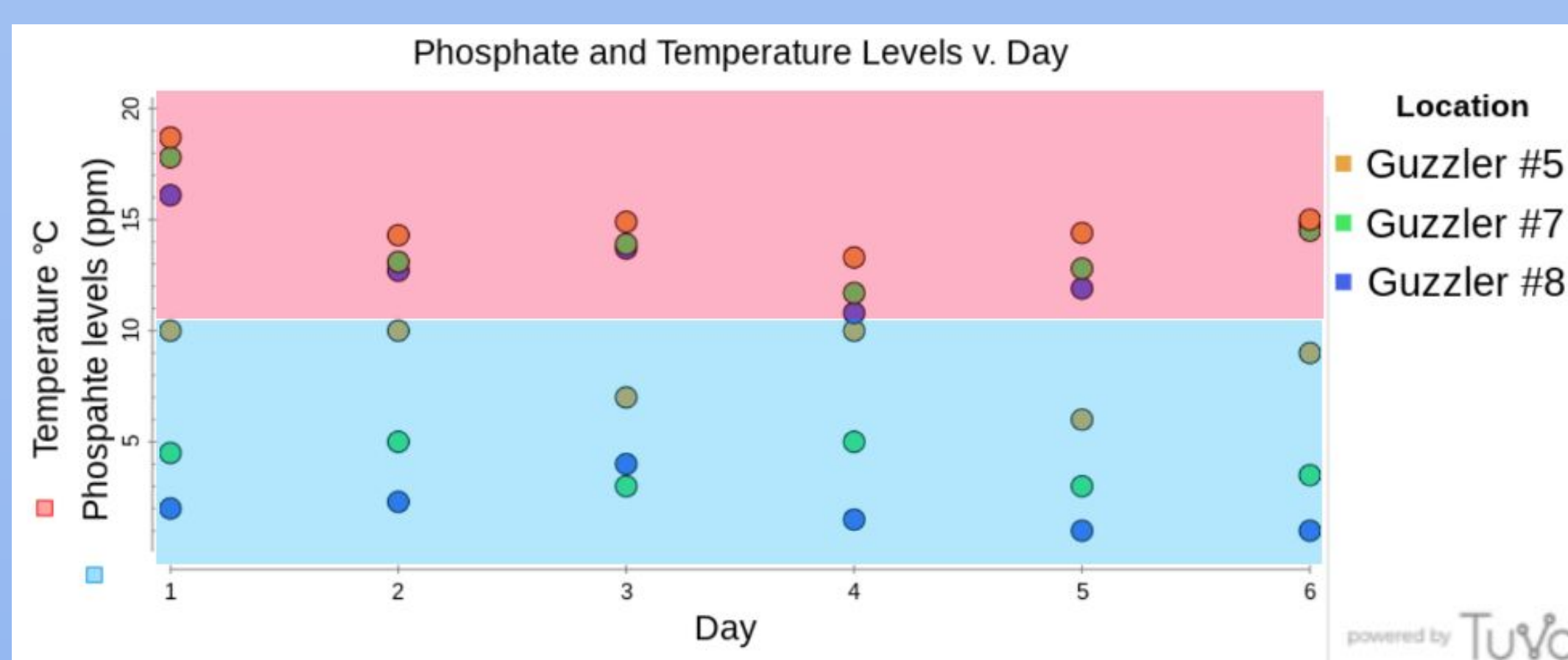


## Results

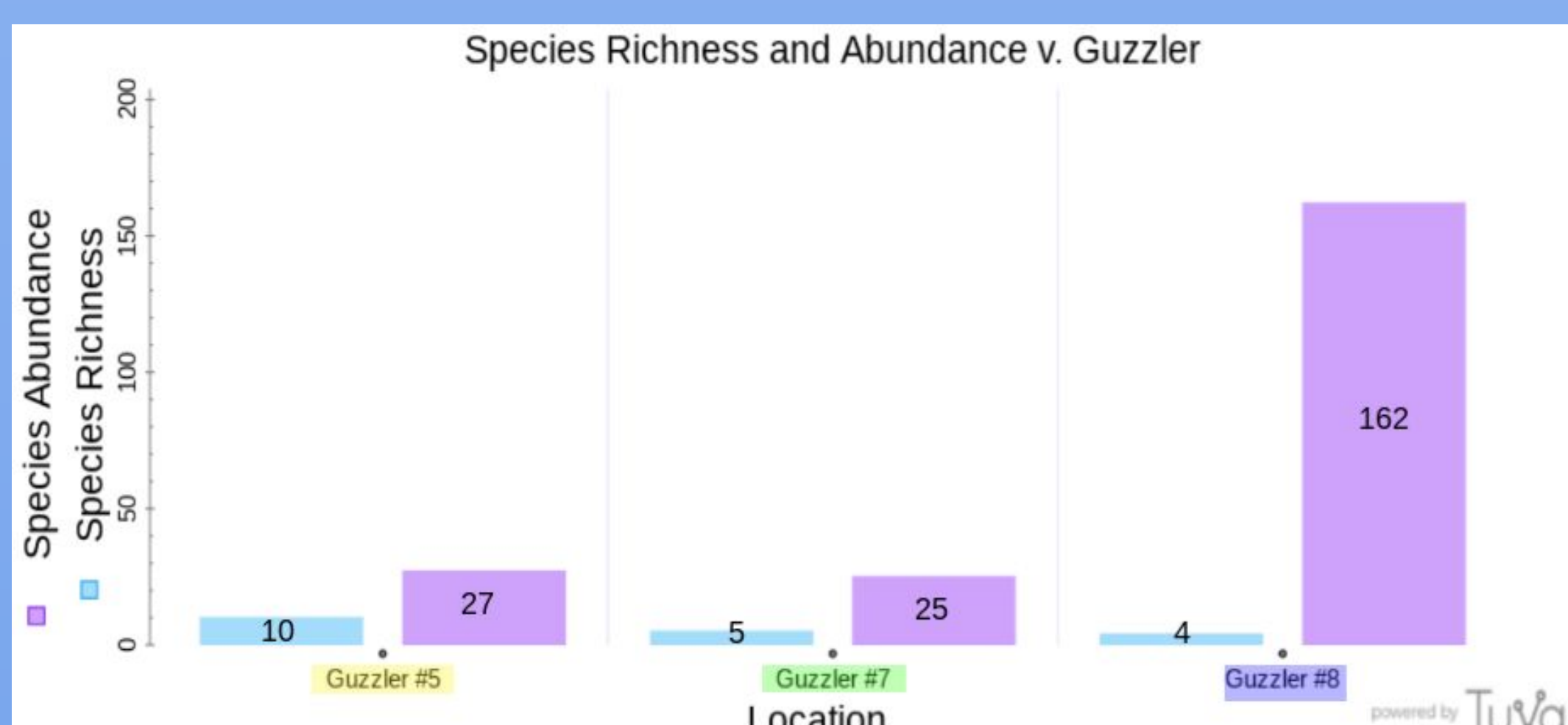
- Water temperature, pH and dissolved oxygen levels stay relatively the same for all three guzzlers
- Phosphate levels were higher in guzzler #5 and lower in guzzler #8
- Variables didn't seem to have an effect on the species richness and abundance of either of the micro or macro invertebrates
  - Dissolved oxygen levels and the species richness ( $r^2 = 0.01318$ )
  - Phosphate levels and the species richness ( $r^2 = 0.01884$ )
- Guzzler #8 had the lowest species richness, but had the highest species abundance.
  - Had a total of 162 individuals while the other two guzzlers had around 25 individuals.
- Species found: Copepods, Red Daphnia, Scuds, Mosquito larvae, Pouch snails, Cocconeis, Colpidium, Euplotes, Pandorina, Chlorophyta, Ostracoda (Some pictures found on the right)



Graph shows the temperature (red), dissolved oxygen levels (yellow), pH levels (purple), and phosphate levels (blue) found in each guzzler.



Both graphs show how the water quality parameters changed each visit



Graph shows total species richness (blue) and total species abundance (purple) found in each guzzler.



Guzzler site map of Elkhorn Slough

## Methods



- Measured the dissolved oxygen (D.O.) levels and water temperature by using the Spark VUE kit with the D.O. probe (GLOBE protocols)



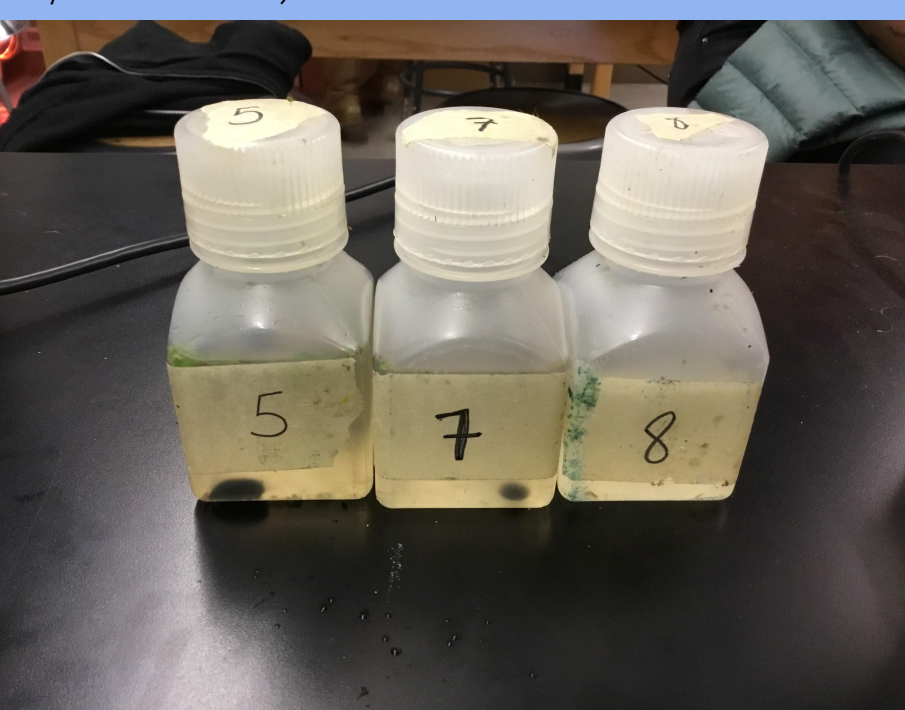
(Photo by: Karina Moreno)

- Wrote down metadata
- Used Spark VUE kit to measure the air temperature and relative humidity (GLOBE protocols)



(Photo by: Karina Moreno)

- Collected water samples from each guzzler site
  - Used a 1000mL plastic container to collect water (2x)
  - Filtered that water through plankton tow net
- Set up HOBO (Honest Observer By Onset) sensors to measure light levels and water temperature every 15 minutes

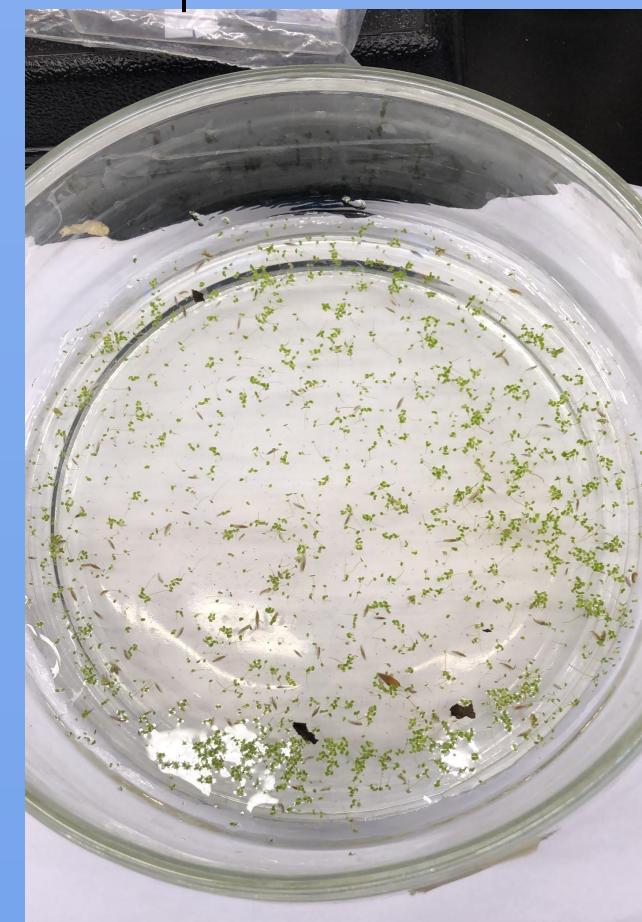


(Photo by: Jasmín Juárez-González)



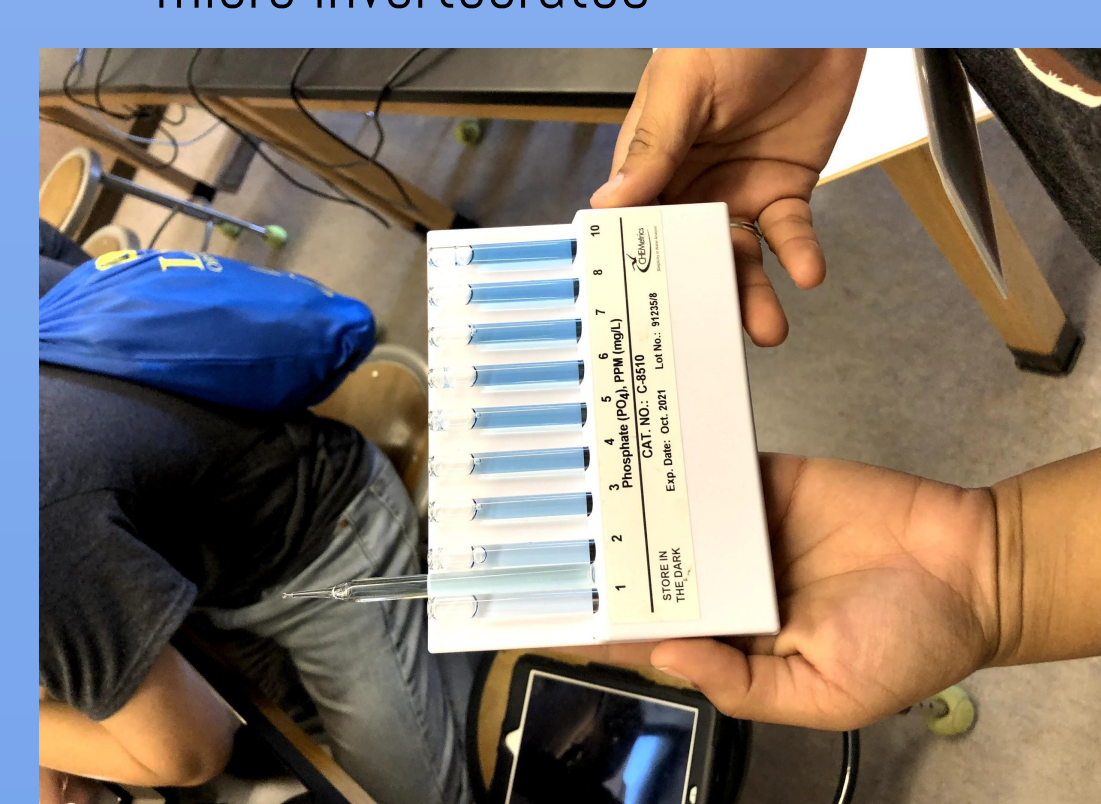
(Photo by: Karina Moreno)

- Went to the microscope lab to identify species of macro and micro invertebrates



(Photo by: Edmundo Luna-Díaz)

- Poured out our 25mL sample into glass container to count the macro invertebrates



(Photo by: Karina Moreno)

- Tested pH levels with pH strips
- We placed 1.5 mL of water onto the petri dishes through 6 drops of water to count the micro invertebrates