

OCTOPUS PARALARVAE ABUNDANCE STUDY IN THE CENTRAL-SOUTH PUGET SOUND



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Introduction

There are over three thousand species of invertebrates, octopuses included, that call the Puget Sound home (National Wildlife Federation 2025). Octopuses are a type of Cephalopod, and they have six different life stages (Vidal 2023). Part of which they are living in a planktonic state, floating in the water column, and the other part in a benthic state, associated with living on the ocean floor (Villanueva 2016). When octopuses hatch, they are considered paralarvae, during this phase they start as planktonic and end the phase by transitioning into being benthic (Villanueva 2016).

Enteroctopus dofleini (Giant Pacific Octopus) (Figure 1a) and *Octopus rubescens* (East Pacific Red Octopus) (Figure 1b) are the only two species of octopus documented in the Puget Sound (Crawley 2021). They are important species for their ecosystem, but only little is known about their early life cycles within the Puget Sound.

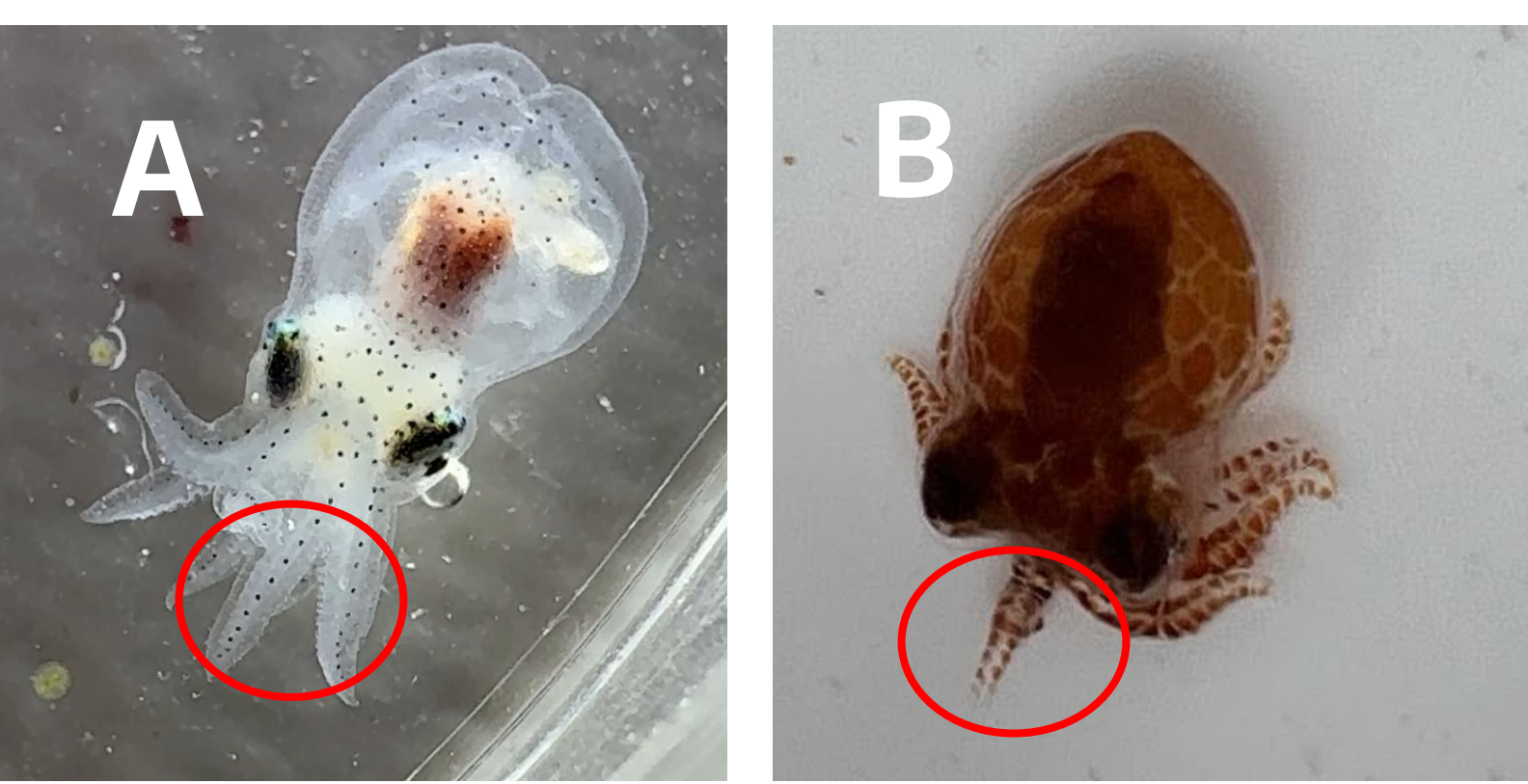


Figure 1A-B. Images of the paralarvae stage for Giant Pacific Octopus (GPO) (A) and East Pacific Red Octopus (Red) (B). chromatophores are depicted in the red circles (color changing pigment cells). GPO's (A) in their paralarvae stage will have one row of chromatophores per arm and Red's (B) will have two rows of chromatophores per arm.

Objectives

1. Determine if there are seasonal differences in abundance of octopus paralarvae across three collection sites in Puget Sound.
2. Determine if there is a correlation between octopus paralarvae metrics (abundance, length) and environmental parameters (water temperature, salinity).

Methods

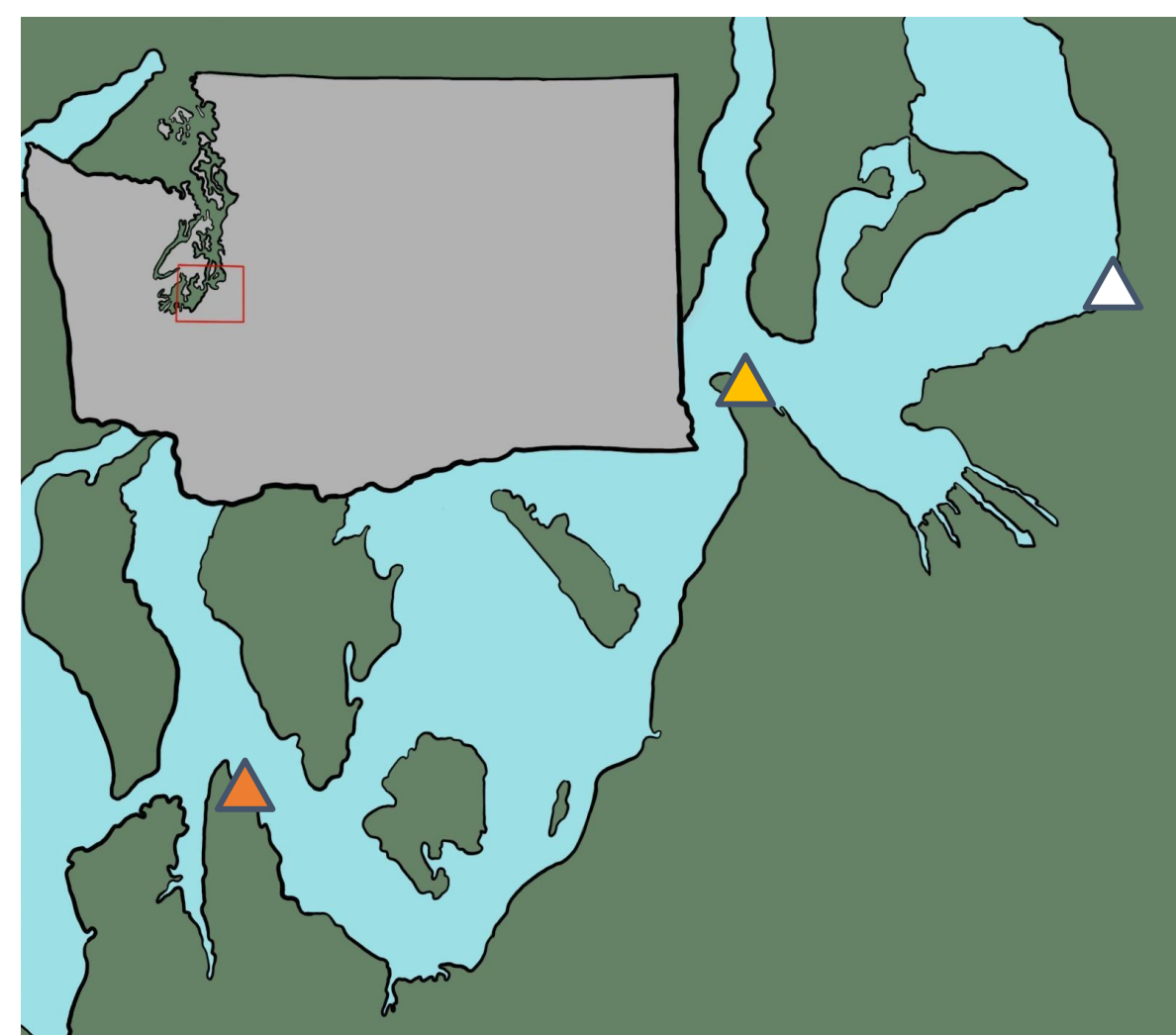


Figure 2 is an outline of the state of Washington (WA) with a red square signifying where in Washington this project took place. The enlarged map behind the WA outline is a zoomed in picture of the area in the red square. The orange triangle represents Zittel's Marina in Olympia, WA, the yellow triangle represents Point Defiance Marina in Tacoma, WA, and the white triangle represents the MaST Center dock in Des Moines, WA. These triangles are the three sites where sampling took place. Map created in Procreate by S. Grover.

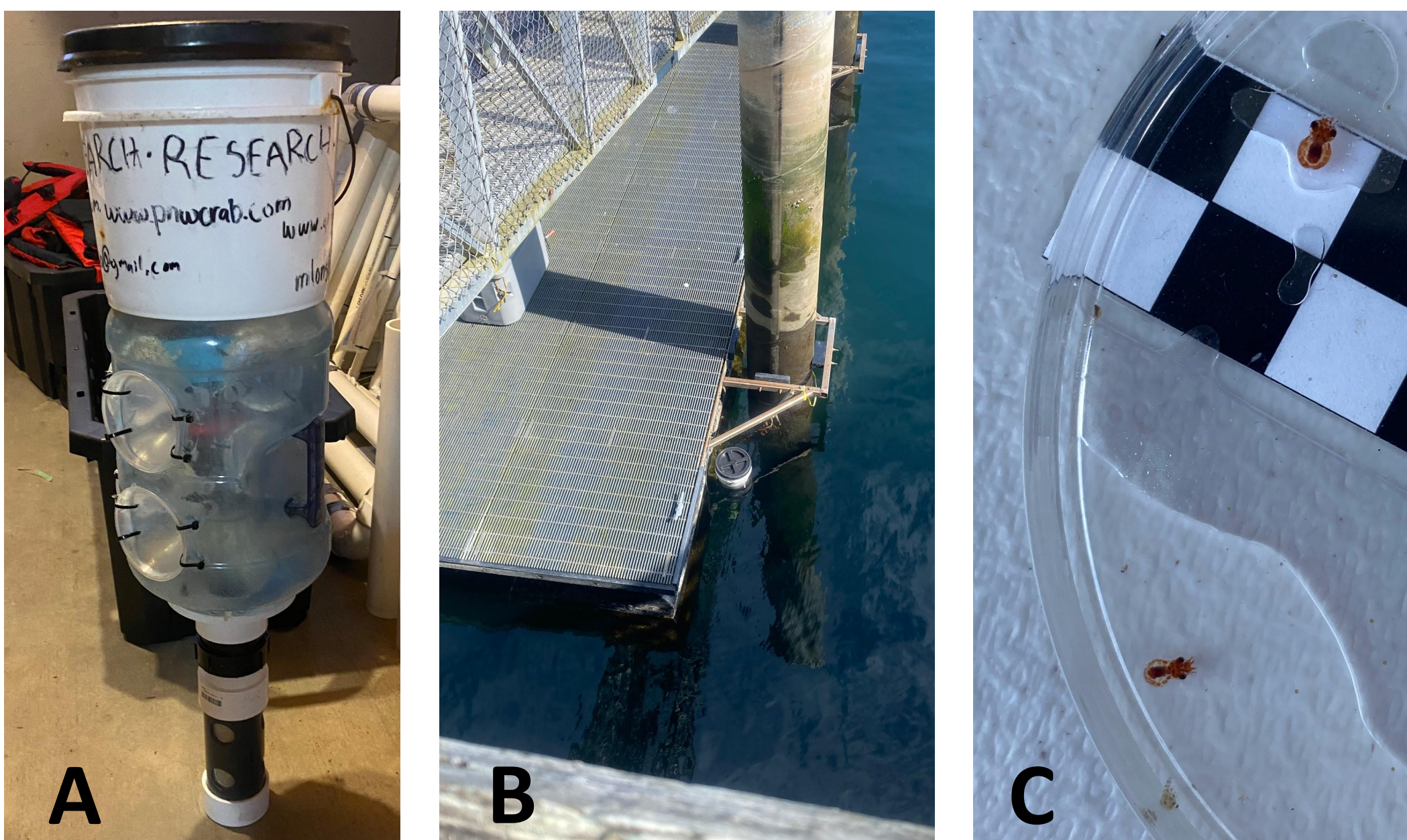


Figure 3A-C. A) is a picture of a light-trap, B) is a picture of the trap deployed in the water, attached to a floating dock. C) is a picture of what would be taken to be measured in Image). The measuring bar squares are 1 cm x 1 cm and the octopus paralarvae pictured are East Pacific Reds.

Results

Paralarvae octopus abundances varied heavily per site, with the Point Defiance Zoo and Aquarium (PDZA) site having significantly more octopus than both the Zittel (ZITT) and MaST Center (MAST) sites (Figure 4). At the PDZA site, octopus paralarvae were more abundant in the summer months; June, July, and August (Figure 5) and were bigger in the summer months; July and August (Figure 6). Pearson correlation tests revealed that there is a correlation between paralarvae length and water temperature (Figure 8c). All paralarvae found were East Pacific Reds expect for one Giant Pacific.

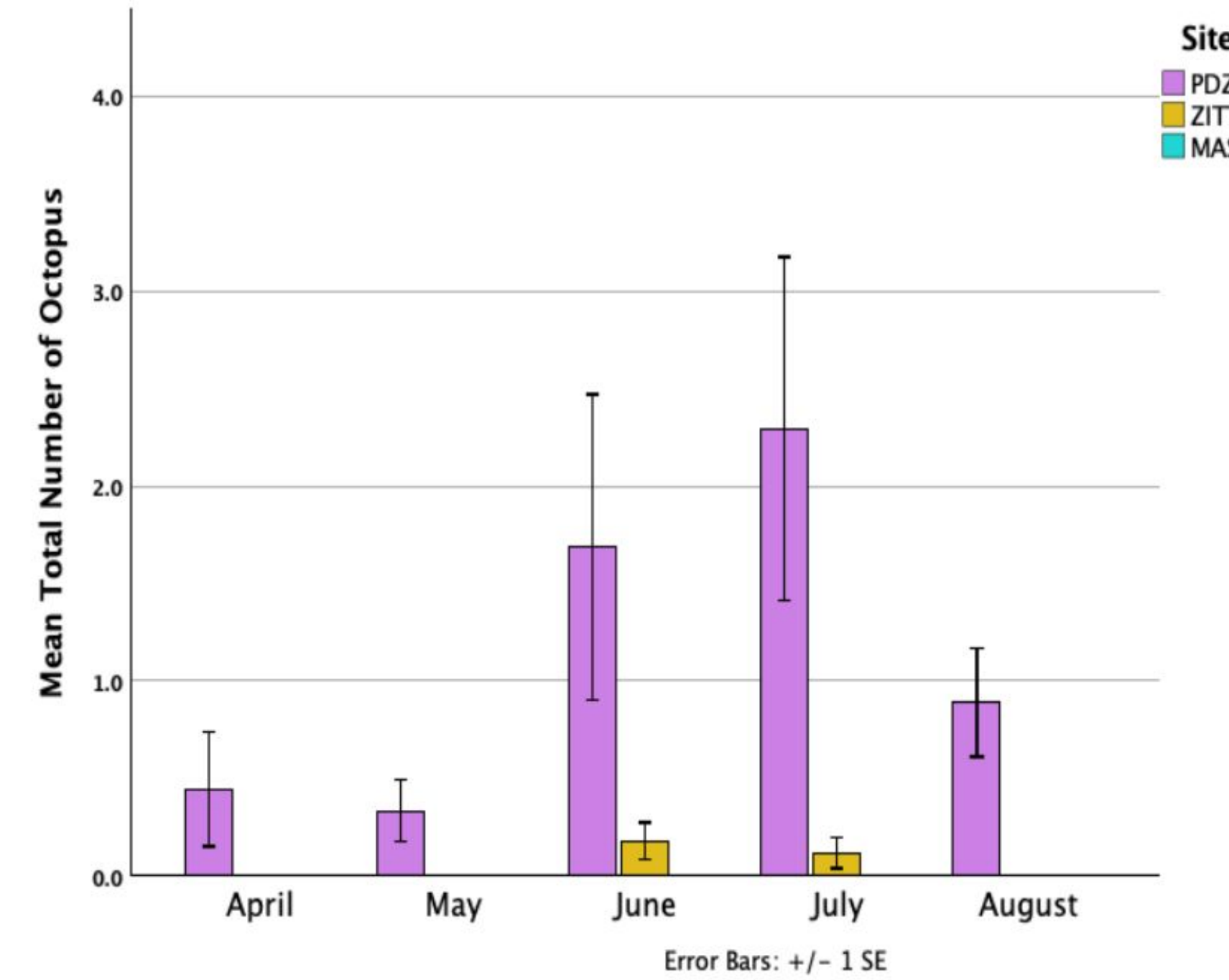


Figure 4. Mean total number of octopus paralarvae per Month by Site. The MaST Center collected no octopus over the course of this experiment. Using pairwise comparisons from the Kruskal Wallis test, the PDZA site had significantly more octopus paralarvae appearances compared to Zittel and the MaST Center ($P < 0.001$) while there was no significant difference between the MaST Center and Zittel octopus paralarvae appearances ($p = 0.302$).

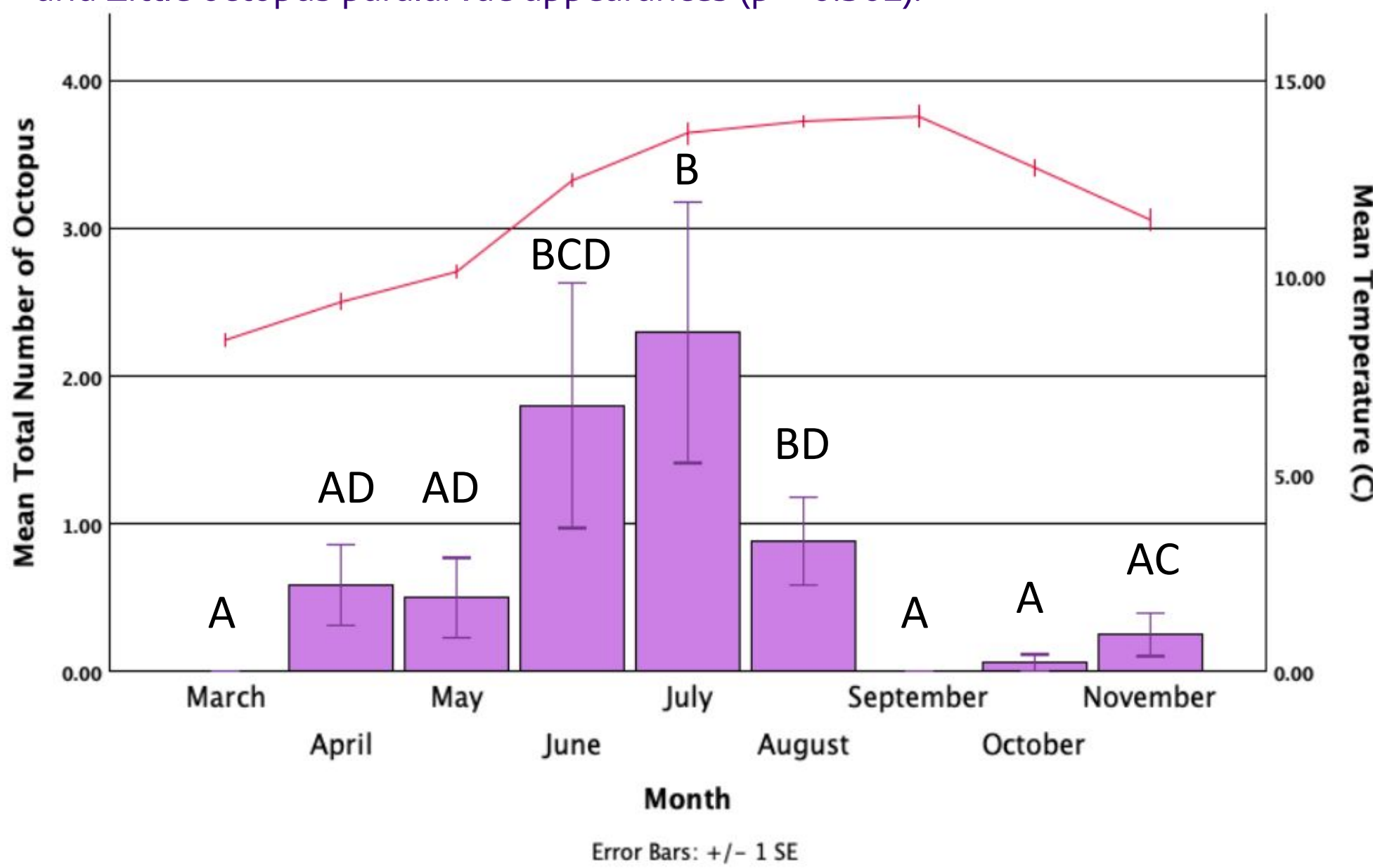


Figure 5. PDZA mean total number of paralarvae octopus versus mean water temperature in Celsius across the sampling months. March and September did not have any octopus paralarvae appearances. Months sharing a letter are not significantly different from one another.

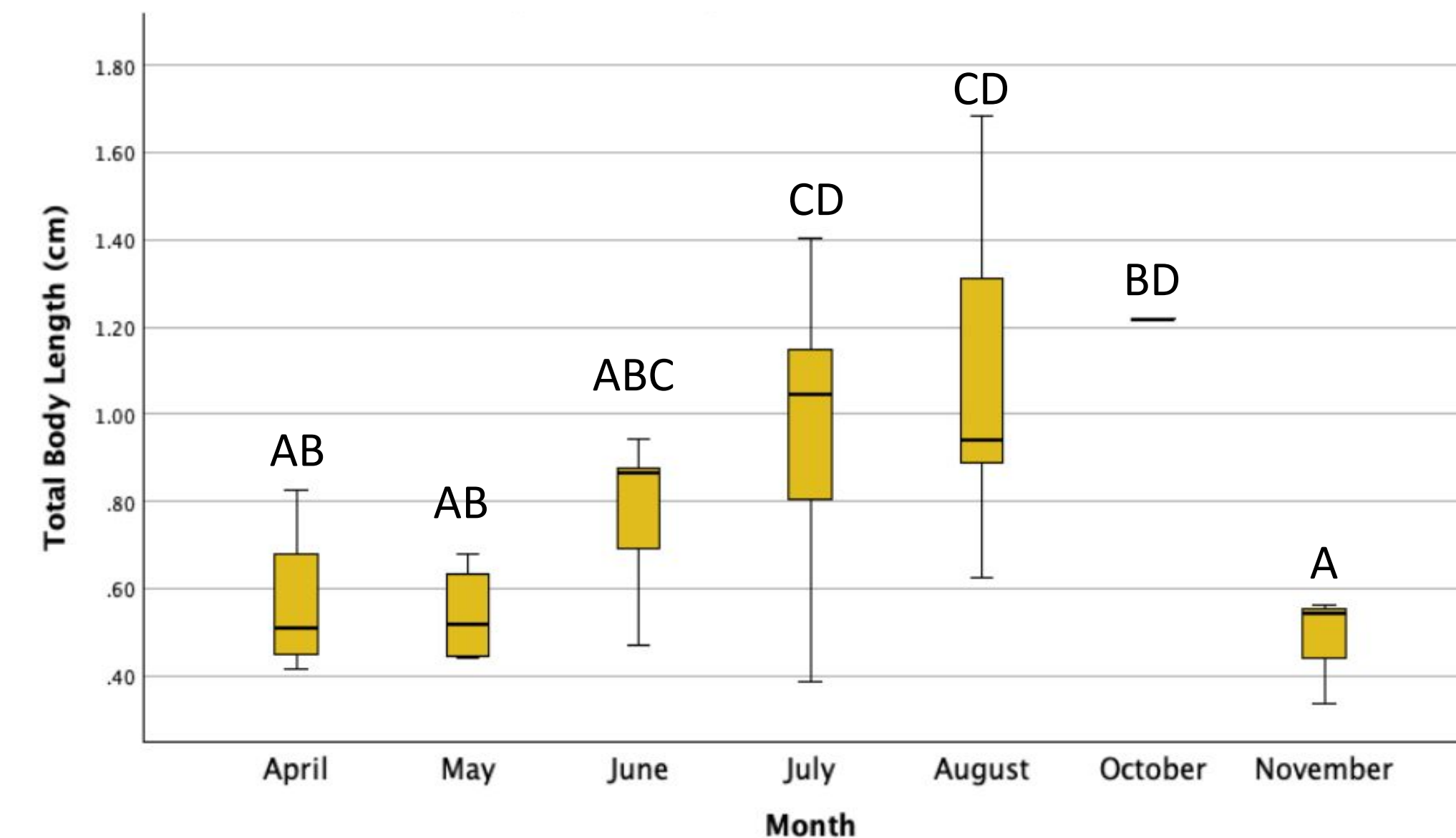


Figure 6. Total paralarvae body length in centimeters versus sampling month at the PDZA site. March and September have been excluded as they did not have any paralarvae. Paralarvae in July and August were significantly bigger than in other months. Months sharing a letter are not significantly different from one another.

Results (Cont.)

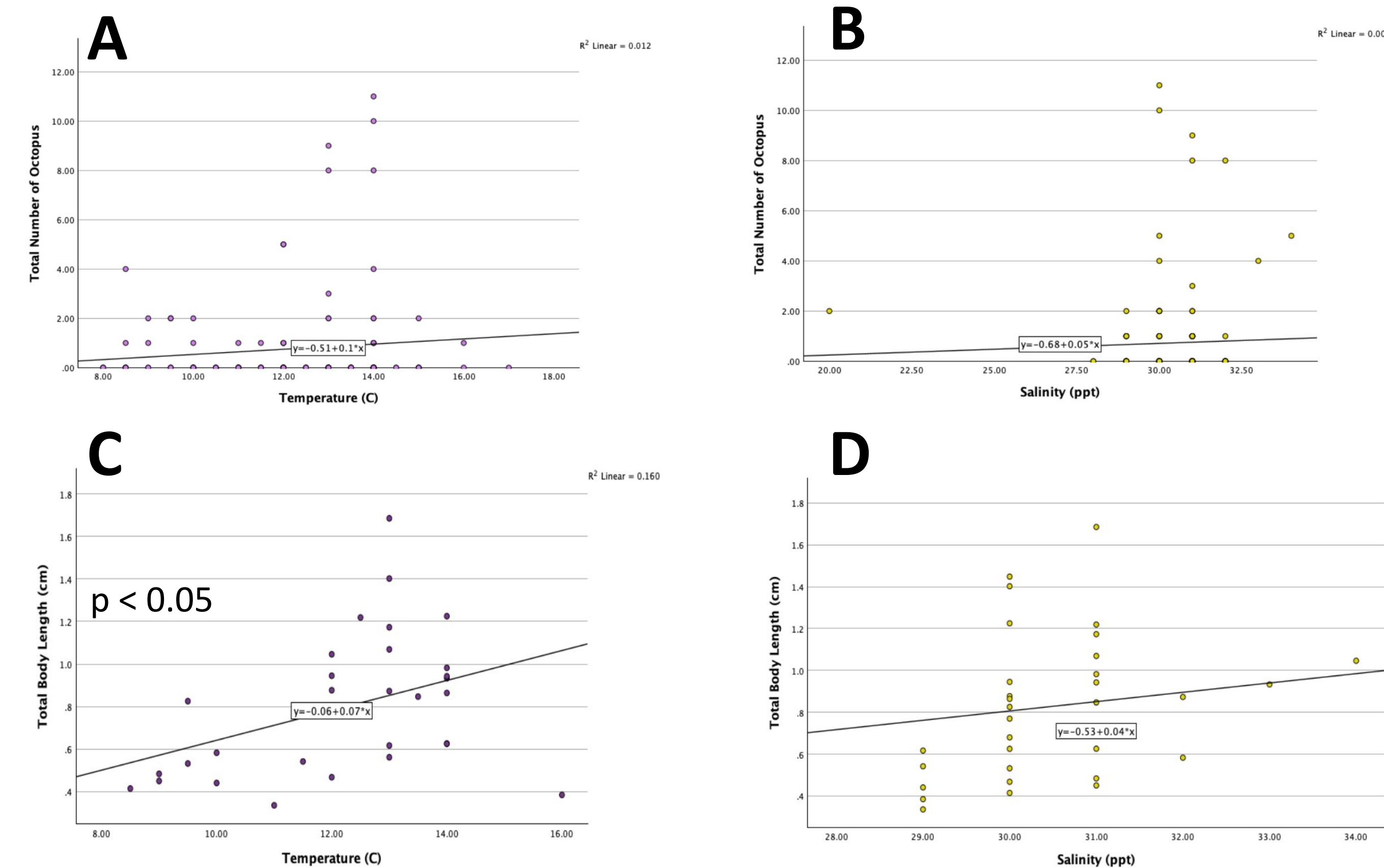


Figure 7A-D. Correlation graphs between total number of paralarvae appearances versus water temperature in Celsius (A) and total number of paralarvae octopus appearances versus salinity (B) at the PDZA site. There was no significant correlation between either variable using the Pearson Correlation test. Correlation graphs between total paralarvae length versus water temperature in Celsius (C) and total paralarvae length versus salinity (D) at the PDZA site. Only total paralarvae length versus water temperature was significant (p -value < 0.05) using Pearson Correlation.

Conclusion and Next Steps

- Paralarvae were more abundant in the summer months (June, July, and August)
- Paralarvae were bigger in the summer months (July and August)
- There was correlation between water temperature and paralarvae length, more research on if temperature does affect length at the paralarval stage like it does in the adult stage (Brewer 2017) should be explored
- For future re-runs of this experiment, more sites should be added and ran from January to December to collect more data



Acknowledgments

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Citations

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