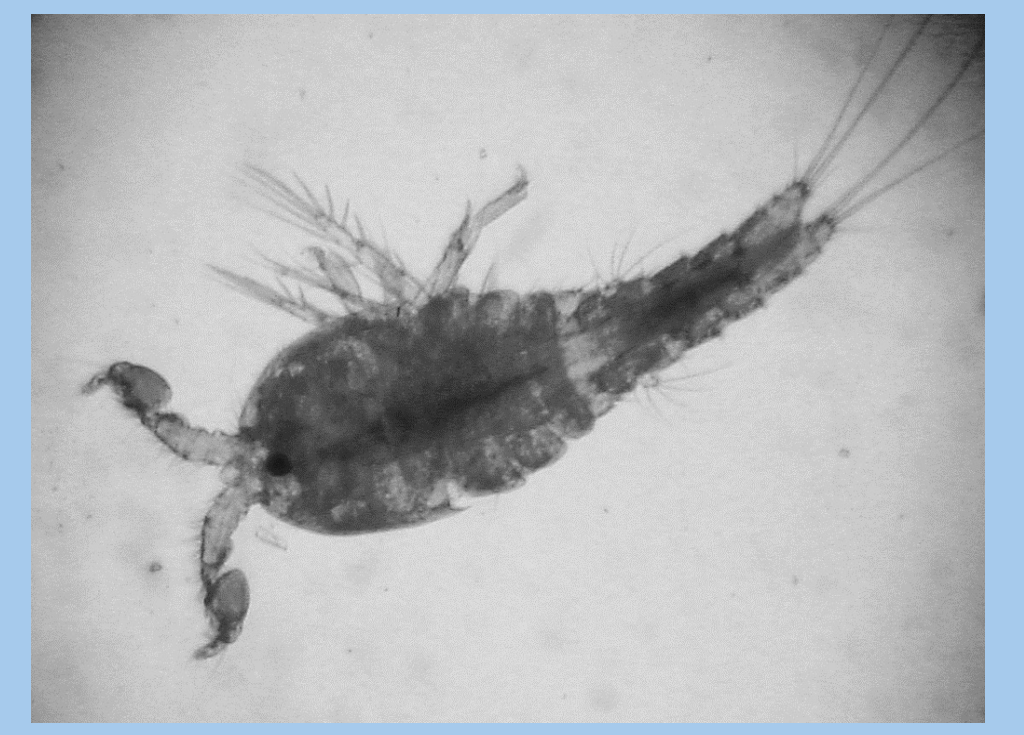


Effects of acidic pH conditions on the survivability of varying *Tigriopus californicus* populations to mimic ocean acidification



Dawn Carter, Emma Duguay, Uma Voley
BIOL 255H, Dr. Chris Willett and Lorrie He
UNC-Chapel Hill Department of Biology



Introduction

- Marine ecosystems are increasingly threatened by the rise in atmospheric carbon dioxide levels, leading to ocean acidification.
- Tigriopus californicus* is a species of copepod typically found in intertidal pools with fluctuating temperatures, salinity, and pH along the Pacific coast of North America.
- Understanding how copepods respond to acidic pHs is crucial for assessing the broader implications of ocean acidification on marine ecosystems.
- Copepod populations exhibit regional variation in response to environmental stressors.¹
- This study aims to explore the effects of acidic pH effects on *T. californicus* by subjecting northern and southern copepod populations to low pH scenarios.

Hypothesis

- Upon exposure to lower levels of pH, there will be lower levels of survivability in copepod populations.
- Within geographic copepod response to lower pH levels, southern populations will exhibit better survival than northern populations.

Methods

Copepod Collection and Propagation

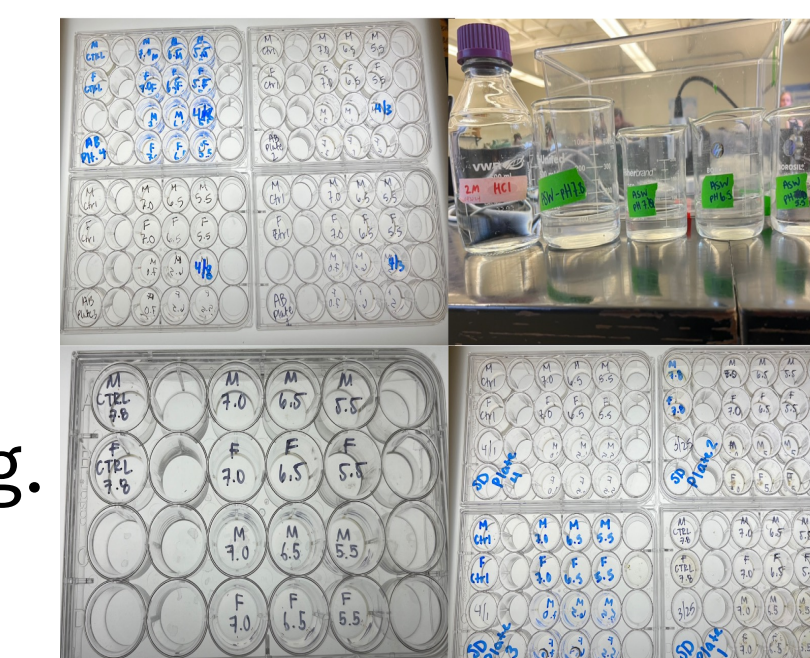
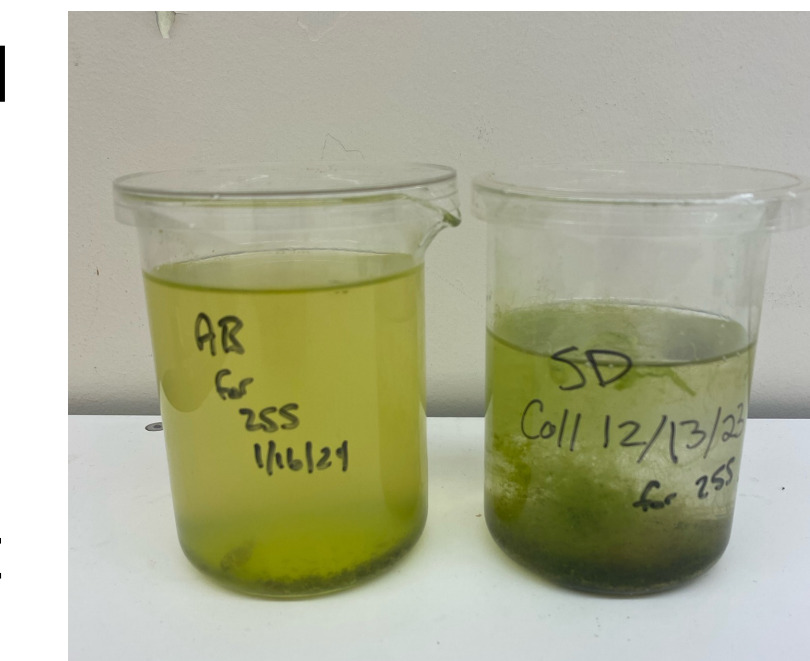
- SD (San Diego) and AB (Abalone Bay) populations of *T. californicus* copepods were collected and transported to the UNC-CH campus.
- Copepod populations were maintained at 20°C with a 12:12 L:D daily light cycle in artificial seawater (ASW) in the laboratory.

pH Stress Experiments

- Treatment solutions were made by adding 0.02M HCl dropwise to beakers of ASW until target pHs were reached (7.8, 7.0, 6.5, 5.5).
- 5 females and 5 males were collected for each treatment level and were placed separately in 1.5mL wells of a cell culture plate and kept in the incubator.

Data Collection and Analysis

- During data collection periods (after 24 and 48 hours), culture plates were removed from the incubator, observed on light boxes, and stirred to observe the number of copepods swimming.
- Data collected was statistically analyzed using Microsoft Excel and R.

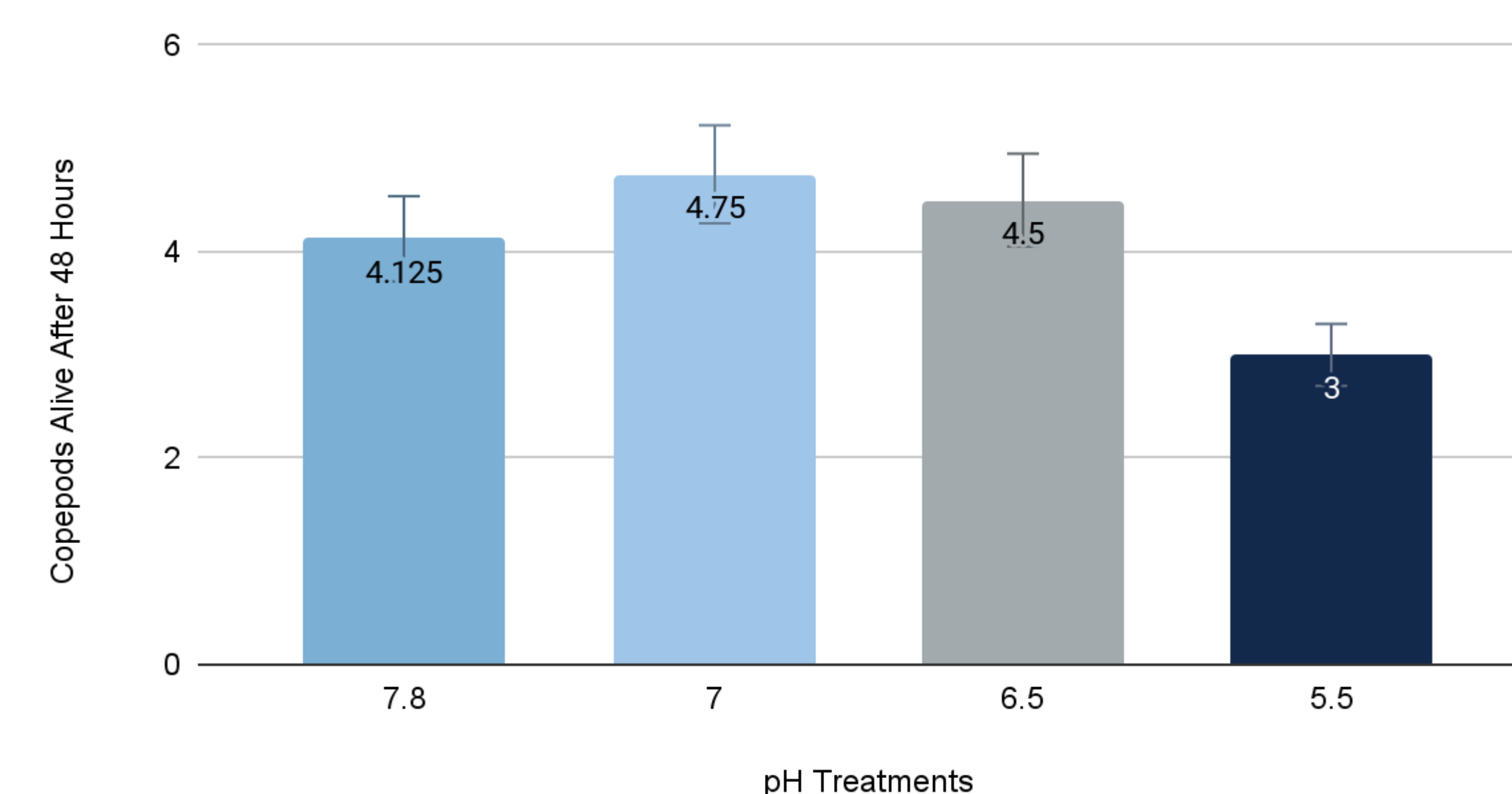


Discussion

- The initial hypothesis was supported: pH impacts the survivability of *T. californicus* copepods from the San Diego (SD) and Abalone Bay (AB) populations.
- Statistical analysis demonstrated only pH treatment had a significant impact on copepod survivability.
- Males demonstrated much higher recovery than females from 24 to 48hr, which made their survivability comparable.

Results

AB Population Averages



SD Population Averages

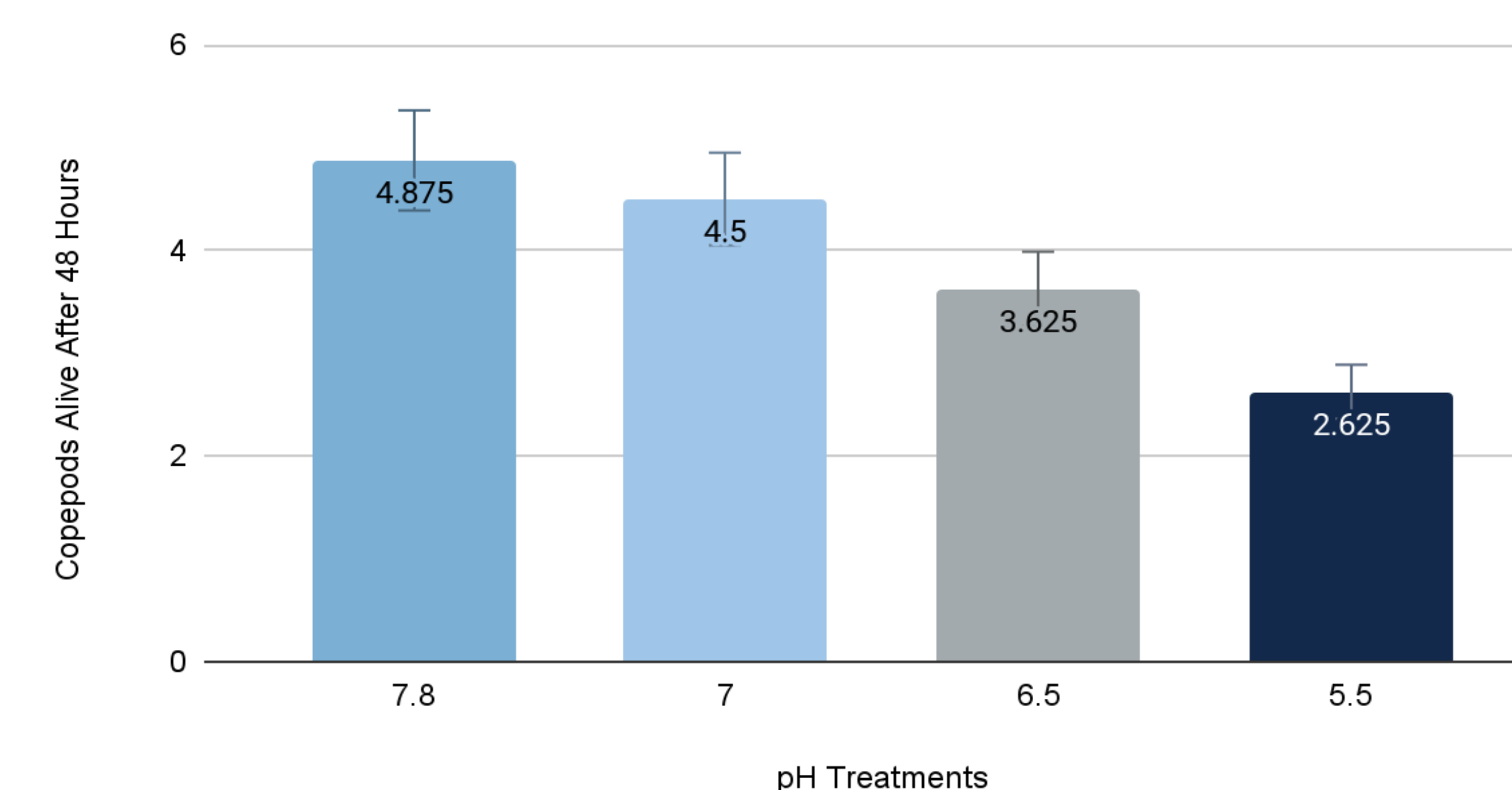


Figure 1. Graph representing the amount of copepods knocked down after 48 hours of pH treatment in both the SD (southern) and AB (northern) populations.

Amount of Copepods Knocked Down After Treatment

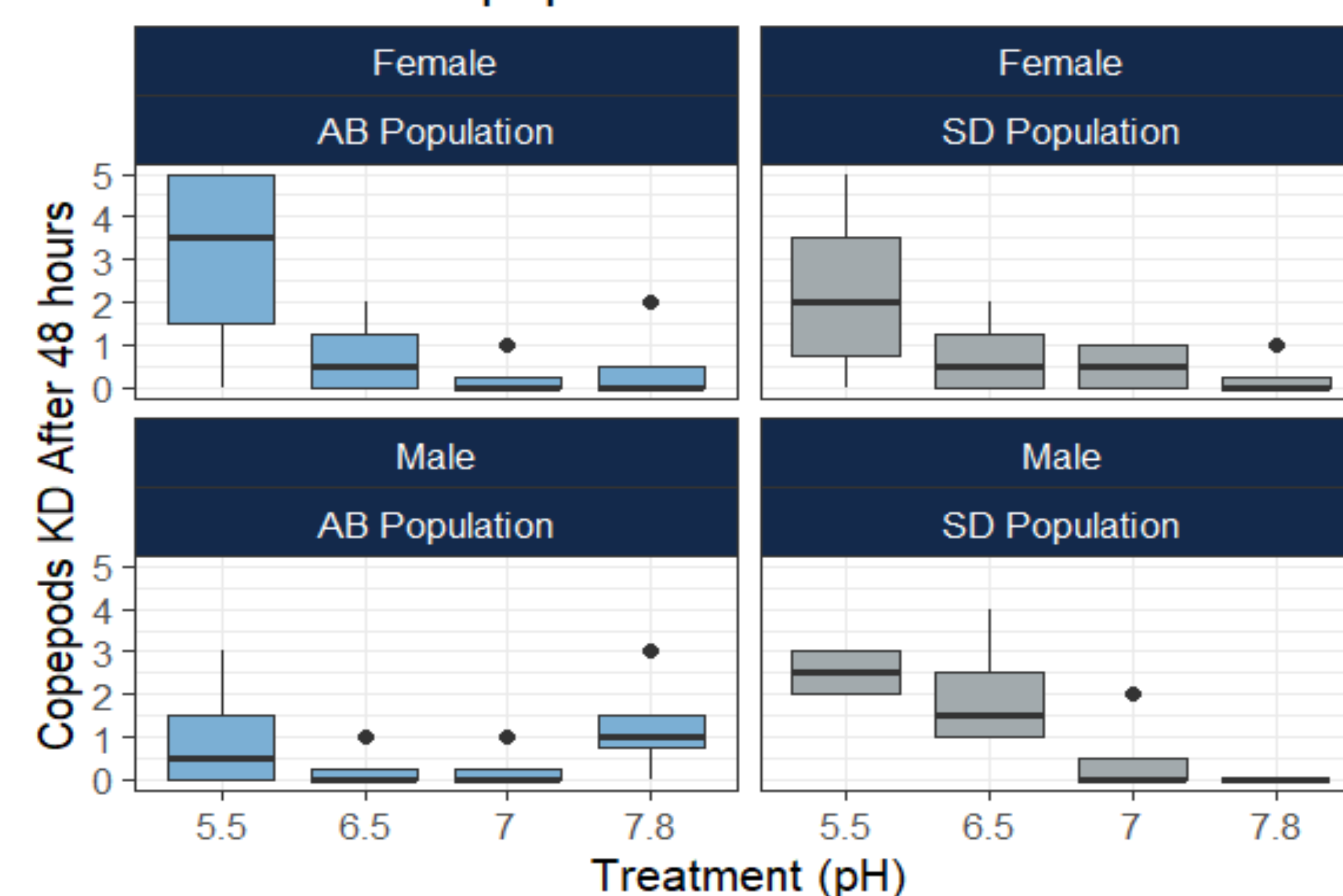


Figure 2. Graph representing the copepods knocked down after 48hr of pH treatment

Average Copepod Population Over Time

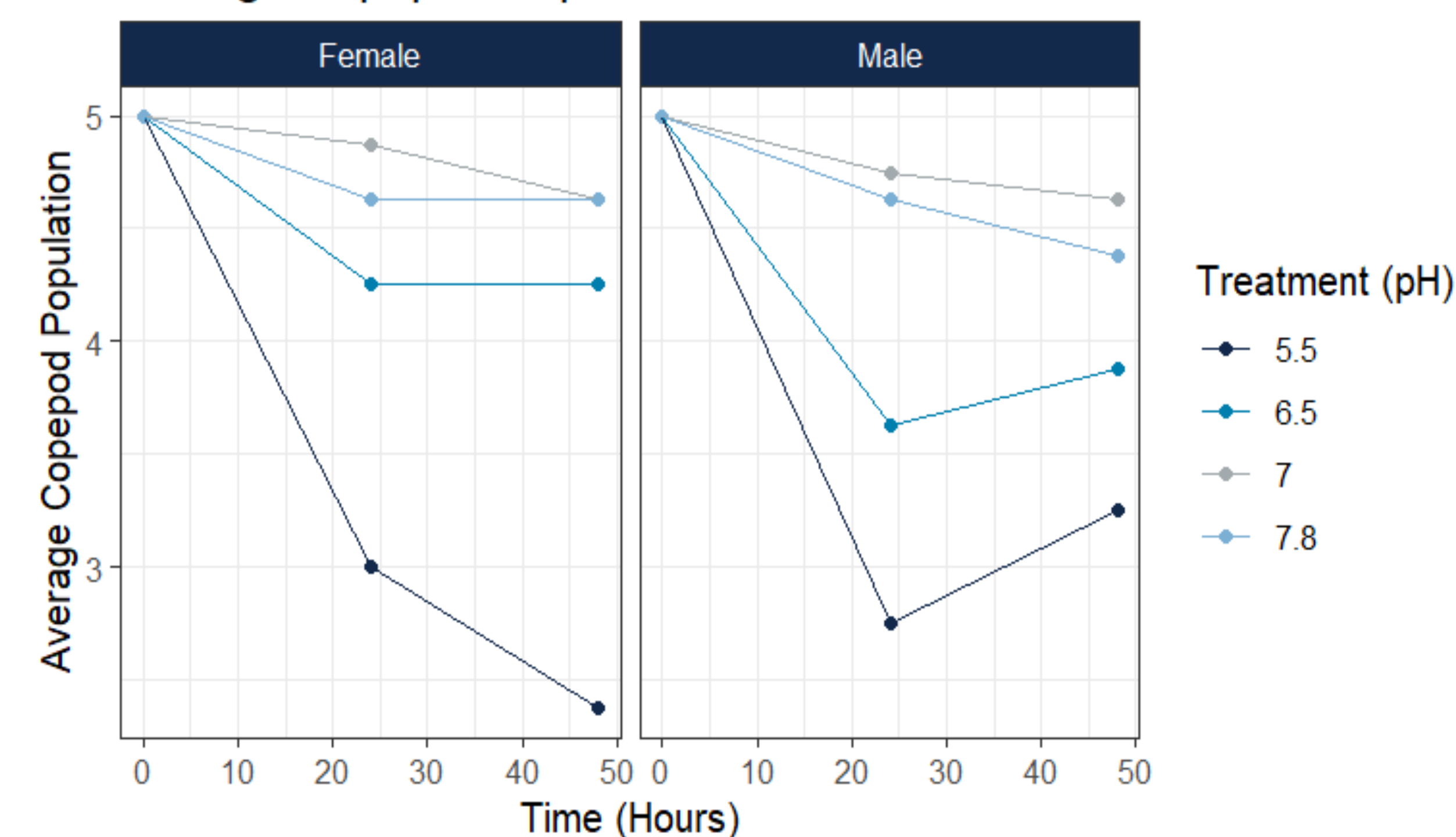


Figure 3. pH exposure experiments at 0, 24, and 48 hours

Conclusions and Future Directions

- Results show that ocean water and tidal pool acidity significantly affect copepod survivability, highlighting the threat of climate change and ocean acidification to marine species.
- Future research will explore sex- and location-based tolerance variations under extreme conditions.
- Hybrid populations resulting from interbreeding will be evaluated for fitness in response to varying pH levels, temperatures, and oxygen availability.

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