Assessing post-release survival of spot prawns (*Pandalus platyceros*) across varying air exposure

E.M. Atkinson­­1,2,\*, J. Houtman2,4, M. A. Lewis1,2,3,4

1*Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada, [postal code]*

*2Department of Biology, University of Victoria, British Columbia, Canada, [postal code]*

*3Department of Mathematics & Statistical Science, University of Alberta, Edmonton, Alberta, Canada [postal code]*

*4Department of Mathematics & Statistical Science, University of Victoria, British Columbia, Canada, [postal code]*

*\*Author to whom correspondence should be addressed: E-mail:* [emmamargaretatkinson@gmail.com](mailto:emmamargaretatkinson@gmail.com)

*Running headline: Spot prawn survival declines with air exposure and high temperature*

**ABSTRACT**

**KEY WORDS**

**INTRODUCTION**

**MATERIALS AND METHODS**

EXPERIMENT SET-UP

A given experimental trial consisted of three components conducted over three days: setting traps for field collection, collecting prawns and conducting the experimental treatment, and processing prawns at the end of the experiment to assess survival and condition. Each trial took 3-4 days to complete (the string of traps to initially collect prawns soaked for 24-48 hours) and we conducted trials between May XX, 2023 and Jun XX, 2023.

To collect prawns for a given trial, we set a string of 10 prawn traps (insert technical specs) baited with pellets (insert technical specs) within a target depth range (30-60 fathoms) that aligns with the approximate depth range targeted by commercial recreational fisheries. Depending on weather conditions and logistics, the string of traps soaked for 24-48 hours before we hauled the traps and began the experimental trial. On the day the trial began, we collected air temperature, water temperature (at 0 m and 10 m depths), and water salinity (at 0 m and 10 m depths) using a YSI (insert technical details). During some of the trials, the YSI was broken, and we collected temperature and salinity data using a thermometer and refractometer respectively. During trap hauling, as each trap came on the boat, we removed any bycatch and emptied the remaining prawns into a small square white bin (10 L) with drilled holes that allowed water to flow through. We placed each white bin in a large fish tote (insert technical specs) filled with seawater (XX L). This method insured that until the trial began, prawns experienced minimal air exposure (10-15 seconds as trap was emptied into white bin). After we finished hauling all traps, we assessed determined how many prawns we would assign to each treatment (minimum 35 per treatment, maximum 70 per treatment to minimise density-dependent effects). We assigned prawns to one of four or five treatments: ‘immediate release’ or air exposures of 30, 60, 90, or 120 minutes. In circumstances where numbers of prawns was a limiting factor, we did not include the 120 minute treatment. The ‘immediate release’ treatment involved hanging prawns off the boat in a mesh drawstring bag (insert mesh specs) 10 fathoms (convert to m) below the surface of the water. To ensure minimal air exposure, we emptied the prawns of one of the white bins into a solid white bin filled with seawater. We counted out the appropriate number of individuals, using a forceps to place a coloured orthodontic elastic band (insert technical specs) on the base of the rostrum (Figure X), and placing each prawn in the mesh bag which was submerged in a 20 L bucket of seawater. Once all prawns had been banded for the ‘immediate release’ treatment, we cinched the mesh bag and attached it to a weighted line hanging off the boat to a depth of 20 m. To begin the air exposure treatments, we removed the remaining white bins from the fish tote at the same time such that all prawns hit the air together. We started a timer for the first treatment (30 minutes) and began to distribute the appropriate number of prawns to each bin, distributing haphazardly by size. For trials with fewer prawns, we allotted one bin for treatment (e.g., 35 prawns per bin) and for trials with more prawns, we allotted two bins per treatment (e.g., two bins, each with 35 prawns). For the duration of the treatment time, we kept the bins under the canopy of the boat such that they received no direct sun exposure or direct precipitation. Choosing different colours for different treatments (the exact colour varied trial to trial), we applied coloured bands to the rostrum of each individual prawn. As the timer for a given treatment went off, we emptied the prawns of a certain band colour into a weighted mesh bag and clipped it to the hanging line such that it descended to hang with the other treatment bags at ~20 m. At the end of the final treatment (90 minutes or 120 minutes), we placed the final group of prawns in a mesh bag hung off the side of the boat such that all treatments experienced the process of being lowered and raised in a mesh bag. Finally, we raised all the bags at the same time and distributed the prawns from all treatments across six baited prawn traps with the tunnels tied shut such that prawns could not escape. To avoid confounding treatment effect with trap effect, we distributed some prawns from each treatment to each trap such that traps contained a mix of all treatments. Once prawns had been distributed, we closed the traps and reset the string of six traps in the same location and depth they had been hauled from initially. For each trial, we timed the length of time it took from the trial ending (mesh bags coming out of water) to the final trap hitting the water during re-setting.

**RESULTS**

**DISCUSSION**

**CONTRIBUTIONS**

**REFERENCES**