In total, x/4598 prawns died; most of them in the longer treatment groups (Figure 1). Prawns left out of water for longer died more than those released quickly (Figure 1). Temperature also influenced survival; individuals that were treated on hot days died more than those treated on cool days (Figure 2). Surprisingly, short prawns survived slightly more than long prawns (Figure 3). The difference was most clear in the very small prawns (<29 mm), which were mostly juveniles (Figure 4). For mid-size prawns (29-38 mm), which were primarily males and transitionals, there were slightly more living prawns than dead prawns. The biggest prawns (>38 mm) died the most often; they were transitional and female (Figure 4).

Leaving prawns out of water for 0-120 minutes resulted in a significant number of dead prawns (Figure 1).

To assess wheth­er our estimates of mortality were accurate and not right-censored (i.e. whether prawns died due to treatment after the experiment), we assessed the surviving prawns for a suite of reflex behaviours. Surviving prawns retained most of their reflexes (Figure 5), indicating that the treatment did not severely damage them. Stoner et al. (2009) exposed prawns to different types of stress, recorded how many reflexes each prawn had lost (impairment score), and monitored their survival for a month in a lab setting. They found that impairment score was a good predictor of mortality for that time period and created a model which gives the probability that a prawn will die within a month, as a function of its impairment score. Using this model, along with the impairment scores recorded for each treatment, we calculated the number of prawns expected to die within a month after the experiment, for each treatment (Figure 6). Across treatments, the predict post-experiment mortality ranged from x-x%; it was higher for shorter treatments, due to the number of surviving prawns.

* + Transition Sentence

For the model selection, BIC did not select a single best model but instead scored five models similarly (Table 2). The five ‘best’ models all included treatment time and air temperature as main effects and as an interaction; four of the top five models included length as well. We performed model averaging based on BIC scores and compared the averaged model against the top model (BIC=0) and a model with only main effects (Table 3). The averaged and best models predict very similarly; the largest deviance between the probability of survival predicted by the two models was 0.0x%. The main-effects-only model also predicted similarly to the averaged model, with a maximum deviance of 5.x% from the averaged model. The accuracy was also very similar for the three models, all within 78-80%. The coefficients in all three models were similar. Because the average model and top model predict similarly, we decided to present results based on the latter for simplicity.

Note: Think about legal changes and implementation the whole time

The top model included two interaction terms, treatment time x temperature and temperature x length, and three main effects, treatment time, temperature and length. The amount of time prawns spent out of water had the biggest effect on prawn survival (Table 3) and the effect increased with temperature (Figure 7). The top model predicted longer prawns will die more frequently at low temperatures, however as temperature increases longer prawns will do better. The effect of length and the temperature length interaction are both relatively small(Figure 8).

Treatment time had the largest effect size after we standardized all three variables, followed by temperature (), and length () (Table 3).

Figure 1 <- Treatment Survival

Figure 2 <- Temp survival

Figure 3 <- Length survival

Figure 4 <- Stage Dist?

Figure 5 <- Reflex Dist

Figure 6 <- predicted release mortality ---- discussion?

Table 2 <- BIC Table

Table 3 <- Model Comparison table

Figure 7<- Survival curves by temperature with temperature-binned survival average points.

Figure 8<- Survival 9 curves, showing relative influence of length and temperature

* Survival
  + Treatment
    - Decrease with treatment
  + Temperature
    - Decrease with temperature
  + Length
    - Decrease with Length
    - Interesting?
      * Data reasons to doubt this?
      * Mention Lost? Probably not

REflexes

* Model Selection
  + Model table
    - No clear winner
    - Similarities of top five models
    - So we did model averaging
  + Averaging Table
    - Almost 0 deviance
    - Accuracy within 1 percent
      * Idea: count number of datapoints they predict differently for?
    - Similar coefficients
    - Semi-justify only using best model
    - Transition sentence into predictions of best model

Model Prediction Results

* + Most Important:
    - Treatment time hurts
    - Temp makes it even worse
    - Treatment temp Figure with average points?
  + Secondary:
    - Length not so important
    - Length Temp interaction inclusion?
      * Statistically significant but maybe small effect size
    - 9 curves figure
  + Coefficients after? Modelling table – relative unimportance of length