Project Write-up Word Draft

Samuel A Welch

Silwood Park, Imperial College London

1. Introduction (2000 words?)
   1. Preamble

What’s the paper about? Why is the area of research interesting?

*[Short preamble about climate change, citing IPCC.]*

*[Specifics about crucial aquatic ecosystems and importance of decomposing communities]*

*This paper is about combined stressors and their effects on bacterial communities, with a particular focus on examining how heat-stressed organisms will respond to different treatments.*

*Warmer temperatures tend to increase bacterial feeding rates, cause them to become smaller, and lose plasmids for non-growth functions (lots of reading to do here). The hypothesis is thus that at higher temperatures, bacterial communities will lose the ability to adapt quickly to stressors – unless they’re able to use HGT (phages, etc.).*

Given that it’s so interesting, why don’t we know the answer?

*What with there being so many stressors and species that are poorly understood on a mechanistic level, it’s necessary to chip away at the coalface of ignorance one set of stressors & species/community at a time.*

*This is just that – a small chip off a very large block, suing the best technology, experimental design, statistics and technology I can get my hands on.*

What’s this about, more specifically? Build from basic hypotheses to complex ones.

*Exposure to heat should make species less able to adapt to combined stressors – so we should see a stronger negative relationship between stressor concentration and enzyme activity in our heat-treated communities – maybe…*

*We would hope to see differences in response (additive, synergistic, etc.) in different communities – but do we expect this to correspond to anything? What under these circumstances qualifies as a surprise?*

*[Explicit statement of hypotheses]*

* 1. Literature Search Stuff

*I’m a little concerned about this section, as I wrote 5000 words worth of literature review in my BSc thesis – but here, assuming I have plenty good to discuss in my discussion I can’t see me having more than 1500. Which means I’m going to have to be very efficient. Broadly, I want to cover:*

* Mixture toxicity: the state of the art
* Aquatic ecosystems and climate change
* Bacterial communities and their response to climate change

I may want a lot of diagrams/tables here.

1. Methods (1000 words?)

This is going to be the hard part. In particular, the more thought I put into experimental design and statistical analysis here, the less I’ll hate myself in August.

[paragraph on overall design of study] + variables and hypotheses

* 1. Culturing Conditions: Dorset Mesocosms and Unit C

2x10 Mesocosms of X m3 litres raised for 10 years – heat treatment, etc. This may need moving around or folding into another paragraph, as it’s awkward where it is.

* 1. Design of Bench Experiments

I put some stuff in a robot and it did all the work for me.

More seriously:

* Selection of stressors probably belongs in the intro, not here
* ???
* Think/
  1. Dataset

Characteristics of the data set (number of obs, etc.)

* 1. Statistical Methods

Models, model checking, comparisons, etc.

* 1. Testing of Hypotheses

How did you test your hypotheses? How can you show your tests were appropriate?

1. Results (1000 words)

[Results described in a logical order]

[Whole buncha nice-looking graphs]

Quote significant results

Results of hypothesis tests

1. Discussion (2000 words?)

What do we know now that we didn’t know before?

What’s the chain of logic that allows us to claim we know this (at a P-value of <0.05)

What are the implications of the links in our logic chain?

How does this effect our understanding of the world? What are the implications (policy?)

What are the specific caveats of this study? What would you do differently?

What would you or others do next?

A beautiful and inspiring conclusion that will be read by three people. Ever. Why this work is interesting to people working in similar – or even different fields.

1. References (~100?)
2. Appendices