Tables

Table 1. Mean trace levels of factors in seawater.

(Salinity – ([Lee et al. 2006](#_ENREF_39)), pH – ([Orr et al. 2005](#_ENREF_44)), Temperature - ([Graham and Barnett 1987](#_ENREF_26)), Heavy metals, sediment, phosphorous - http://www.seafriends.org.nz/oceano/seawater.htm, Nitrates - http://www.advancedaquarist.com/2003/8/chemistry, Ammonium - http://reefkeeping.com/issues/2007-02/rhf/, Tributyltin - http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/tributyltin/fs-final.cfm)

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Factor** | **Trace Level** | **Units** |
| Nutrients | Ammonium | 0.01391 | µM |
| Phosphorous | 0.446 | µM |
| Nitrate | 0.254 | µM |
| Heavy Metals | Copper | 0.9 | µg/L |
| Cadmium | 0.11 | µg/L |
| Lead | 0.03 | µg/L |
| Mercury | 0.15 | µg/L |
| Nickel | 6.6 | µg/L |
| Tributyltin | 0 | µg/L |
| Zinc | 5 | µg/L |
| Ocean Chemistry | Acidification | 8.1 | pH |
| Salinity | 35 | psu |
| Sediment | 0 | mg/L |
| Temperature | 29 | °C |

Table 2. Number of studies per factor used within the GLMM separated by life history stage.

|  |  |  |
| --- | --- | --- |
| Factor | Fertilisation Model | Survivorship Model |
| Ammonium | 2 | 2 |
| Phosphorous | 2 | NA |
| Nitrate | 1 | NA |
| Copper | 5 | 1 |
| Cadmium | 2 | NA |
| Lead | 1 | 1 |
| Mercury | NA | 1 |
| Nickel | 1 | NA |
| Tributyltin | 1 | NA |
| Zinc | 2 | NA |
| Acidification | 1 | 2 |
| Salinity | 2 | 3 |
| Sediment | 3 | NA |
| Temperature | 1 | 3 |

Table 3. Results of the final GLMM for fertilisation success incorporating five factors - sediment, phosphorous, copper, salinity and salinity squared. (a) Results of the random effects where either treatment or experiment were used as variables, (b) Results of the fixed effects set as each of the factors, (c) Correlation effects to determine the relationship of each of the fixed effect variables. (Significant codes: 0 \*\*\*, 0.001 \*\*, 0.01 \*, 0.1 ., 1 -).

(a). Random Effects

|  |  |  |
| --- | --- | --- |
| **Group** | **Variance** | **Standard Deviation** |
| Treatment | 1.122 | 1.059 |
| Experiment | 1.944 | 1.394 |

(b) Fixed Effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factors** | **Estimate** | **Standard Error** | **z value** | **Pr (>|z|)** |  |
| Sediment | -0.016331 | 0.003152 | -5.181 | 0.0009 | \*\*\* |
| Phosphorous | -0.021737 | 0.005929 | -3.666 | 0.0002 | \*\*\* |
| Copper | -0.032662 | 0.004536 | -7.200 | 0.0000 | \*\* |
| Salinity | 4.9655077 | 1.626386 | 3.053 | 0.0022 | \*\* |
| Salinity2 | -0.071147 | 0.025435 | -2.797 | 0.0051 | \* |

(c) Correlation of Fixed Effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factor** | **Intercept** | **Sediment** | **Phosphorous** | **Copper** | **Salinity** |
| Sediment | -0.011 |  |  |  |  |
| Phosphorous | 0.013 | -0.021 |  |  |  |
| Copper | -0.004 | 0.034 | 0.002 |  |  |
| Salinity | -0.998 | 0.007 | -0.013 | 0.003 |  |
| Salinity2 | 0.993 | -0.006 | 0.011 | -0.004 | -0.999 |

Table 4. Results of the final GLMM for survivorship success incorporating five factors - copper, lead, salinity, temperature and temperature squared. (a) Results of the random effects where either treatment or experiment were used as variables, (b) Results of the fixed effects set as each of the factors, (c) Correlation effects to determine the relationship of each of the fixed effect variables. (Significant codes: 0 \*\*\*, 0.001 \*\*, 0.01 \*, 0.1 ., 1 -).

(a). Random Effects

|  |  |  |
| --- | --- | --- |
| **Group** | **Variance** | **Standard Deviation** |
| Treatment | 2.099 | 1.449 |
| Experiment | 0.242 | 0.492 |

(b) Fixed Effects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors** | **Estimate** | **Standard Error** | | **z value** | **Pr (>|z|)** |  |
| Copper | -0.0319 | | 0.0032 | -9.842 | 0.0000 | \*\*\* |
| Lead | -0.0002 | 0.0001 | | -4.222 | 0.0000 | \*\*\* |
| Temperature | 20.0160 | 10.0510 | | 1.918 | 0.0552 | \* |
| Temperature 2 | -0.3455 | 0.1754 | | -1.970 | 0.0489 | . |
| Salinity | 1.3220 | 0.7904 | | 1.673 | 0.0944 | . |

(c) Correlation of Fixed Effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factor** | **Intercept** | **Copper** | **Lead** | **Temperature** | **Temperature2** |
| Copper | 0.239 |  |  |  |  |
| Lead | -0.067 | 0.060 |  |  |  |
| Temperature | -0.997 | -0.243 | 0.067 |  |  |
| Temperature 2 | 0.997 | 0.245 | -0.068 | -1.000 |  |
| Salinity | -0.055 | 0.016 | 0.012 | -0.012 | 0.013 |

Table 5. Variance analysis conducted on the results of both GLMM’s investigating fertilisation success and larval survivorship on each of the significant factors observed.

|  |  |  |
| --- | --- | --- |
| **Life Stage** | **Factor** | **Model variance explained (%)** |
| Fertilisation | Copper | 4.425226 |
| Sediment | 2.197206 |
| Ammonium | 81.645230 |
| Phosphate | 5.755747 |
| Salinity | 5.976591 |
| Survivorship | Copper | 7.8116228 |
| Lead | 91.7924226 |
| Salinity | 0.3959546 |