Tables

Table 1. Number of studies per factor used within the GLMMs 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 2. Results of the final GLMM for fertilisation success incorporating five factors - sediment, ammonium, phosphorous, copper, salinity (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 | 0.9703 | 0.9851 |
| Experiment | 1.7939 | 1.3394 |

(b) Fixed Effects

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Factors** | **Estimate** | **Standard Error** | **z value** | **Pr (>|z|)** |  |
| Sediment | -17.6355 | 4.3465 | -4.057 | 4.96e-05 | \*\*\* |
| Ammonium | -4.9171 | 0.8708 | -5.647 | 1.64e-08 | \* |
| Phosphorous | -1.5390 | 0.6168 | -2.495 | 0.012596 | \* |
| Copper | -6.4783 | 0.8436 | -7.679 | 1.60e-14 | \*\*\* |
| Salinity | 42.3975 | 11.7522 | 3.608 | 0.000309 | \*\*\* |
| Salinity2 | -23.4423 | 7.9346 | -2.954 | 0.003132 | \*\* |

(c) Correlation of Fixed Effects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factor** | **Intercept** | **Sediment** | **Ammonium** | **Phosphorous** | **Copper** | **Salinity** |
| Sediment | -0.033 |  |  |  |  |  |
| Ammonium | 0.006 | 0.009 |  |  |  |  |
| Phosphorous | 0.011 | -0.021 | -0.448 |  |  |  |
| Copper | 0.002 | 0.025 | 0.004 | -0.001 |  |  |
| Salinity | -0.984 | 0.017 | -0.010 | -0.013 | -0.008 |  |
| Salinity2 | 0.954 | -0.015 | 0.009 | 0.011 | 0.008 | -0.992 |

Table 3. Results of the final GLMM for survivorship success incorporating three factors - copper, lead and salinity (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 | 1.842 | 1.357 |
| Experiment | 2.034 | 1.426 |

(b) Fixed Effects

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Factors** | **Estimate** | **Standard Error** | | **z value** | **Pr (>|z|)** |  |
| Copper | -15.708 | | 1. | 623 -9.676 | < 2e-16 | \*\*\* |
| Lead | -6.205 | 1.372 | | -4.523 | 6.09e-06 | \*\*\* |
| Salinity | 9.289 | 4.619 | | 2.011 | 0.0443 | \* |
| Salinity2 | -5.236 | 4.048 | | -1.294 | 0.1958 |  |

(c) Correlation of Fixed Effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factor** | **Intercept** | **Copper** | **Lead** | **Salinity** |
| Copper | -0.013 |  |  |  |
| Lead | -0.018 | 0.026 |  |  |
| Salinity | -0.764 | -0.014 | -0.015 |  |
| Salinity2 | 0.562 | 0.009 | 0.011 | -0.955 |

Table 4. Variance analysis conducted on the results of both GLMMs investigating fertilisation success and larval survivorship on each of the significant factors observed.

|  |  |  |
| --- | --- | --- |
| **Life Stage** | **Factor** | **Model variance explained (%)** |
| Fertilisation | Copper | 35.905 |
| Sediment | 13.163 |
| Ammonium | 3.803 |
| Phosphate | 4.615 |
| Salinity | 42.513 |
| Survivorship | Copper | 92.016 |
| Lead | 3.367 |
| Salinity | 4.616 |

Table 5. Minimum and maximum values used for each factor in each life history stage analysis to rescale variables.

|  |  |  |  |
| --- | --- | --- | --- |
| **Life Stage** | **Factor** | **Maximum Value** | **Minimum Value** |
| Fertilisation | Sediment (mg/L) | 300 | 0.3 |
| Ammonium (µM) | 100 | 0.1 |
| Phosphate (µM) | 100 | 0.1 |
| Copper (µg/L) | 200 | 2 |
| Salinity (psu) | 36.8 | 18.4 |
| Larval Survivorship | Lead (µg/L) | 20000 | 20 |
| Copper (µg/L) | 500 | 5 |
| Salinity (psu) | 36.8 | 18.4 |
| Temperature (°C) | 36 | 27 |
| pH | 8.2 | 7.3 |

Table 6. Results of the water analysis conducted by EnviroLab for three test sites - Chowder Bay in Sydney, Mona Vale in Sydney and Lizard Island in Queensland.

|  |  |  |  |
| --- | --- | --- | --- |
| **Factor** | **Chowder Bay** | **Mona Vale** | **Lizard Island** |
| Zinc (µg/L) | 2 | <1 | 1 |
| Nickel (µg/L) | <1 | <1 | <1 |
| Mercury (µg/L) | <0.05 | <0.05 | <0.05 |
| Copper (µg/L) | 1 | <1 | <1 |
| Lead (µg/L) | <1 | <1 | <1 |
| Cadmium (µg/L) | <0.1 | <0.1 | <0.1 |
| Phosphorus (µM) | <0.25 | <0.5 | <0.05 |
| pH | 8 | 8.2 | 7.2 |
| Nitrate (mg/L) | <0.005 | <0.005 | <0.005 |
| Ammonia (µM) | <0.005 | <0.005 | 0.016 |
| Salinity (psu) | 29 | 31 | 32 |
| Suspended solids (mg/L) | 17 | <5 | <5 |
| Temperature (°C) | 24 | 24 | 28 |