### Tables

**Table 1.** Seawater carbonate chemistry during larval incubations. Values are mean ± SD. Temperature and salinity were measured daily, and dissolved inorganic carbon (DIC) and total alkalinity (TA) were measured from preserved bottle samples that were collected weekly. pHSWS and pCO2 were calculated from temperature, salinity, DIC and TA. Reproduced from Slesinger et al. (2024).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Question | Target pCO2 | Target Temperature | pHSWS | pCO2 | °C | Salinity | DIC  (mol/kg) |
| Control for all other treatments | 360 µatm | 6°C | 8.03  ± 0.11 | 394.28  ± 132.84 | 6.14  ± 0.29 | 29.84 ± 1.48 | 1943.38 ± 105.62 |
| Effect of acidification | 1560 µatm | 6°C | 7.47  ± 0.03 | 1480.80 ± 126.37 | 6.04  ± 0.51 | 29.36 ± 1.31 | 2078.14 ± 81.47 |
| Effect of warm conditions | 360 µatm | 10°C | 8.00  ± 0.03 | 409.60  ± 36.75 | 10.22  ± 0.24 | 29.63 ± 0.67 | 1911.35 ± 22.43 |
| Effect of warm + acidified conditions | 1560 µatm | 10°C | 7.40  ± 0.06 | 1780.01 ± 245.48 | 10.20 ± 0.37 | 29.63 ± 0.67 | 2076.27 ± 24.75 |
| Effect of cold conditions | 360 µatm | 3°C | 8.12  ± 0.07 | 297.20  ± 65.51 | 3.03  ± 0.39 | 30.21 ± 1.11 | 1936.76 ± 76.24 |
| Effect of cold + acidified conditions | 1560 µatm | 3°C | 7.48  ± 0.09 | 1434.95  ± 304.70 | 3.10  ± 0.18 | 29.77 ± 1.30 | 2093.99 ± 76.91 |

**Table 2**. Gene expression sampling scheme. Treatment duration from hatch until gene expression sampling are provided in both Julian days and Degree-Days (DD) calculated from average temperatures. Differential expression analysis was performed for all treatments relative to control conditions (6°C, 360 µatm pCO2).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Question | Target Temperature | Target pCO2 | Individuals / Libraries | Replicate tanks | Treatment duration from hatch to RNASeq sampling, days (degree days) | Larval length (Mean ± SD) |
| Control for all other treatments | 6°C | 360 µatm | 14 | 4 | 21 (129) | 6.5±0.6 |
| Effect of acidification | 6°C | 1560 µatm | 13 | 4 | 21 (127) | 6.7±0.5 |
| Effect of warm conditions | 10°C | 360 µatm | 11 | 4 | 13 (133) | 5.7±0.4 |
| Effect of warm + acidified conditions | 10°C | 1560 µatm | 12 | 4 | 13 (133) | 6.0±0.4 |
| Effect of cold conditions | 3°C | 360 µatm | 12 | 1 | 28 (85) | 6.7±0.4 |
| Effect of cold + acidified conditions | 3°C | 1560 µatm | 11 | 4 | 28 (87) | 6.4±0.6 |

**Table 3**. Summary of phenotypic effects of treatments on mortality, growth, and condition during the larval stage, adapted from data previously reported in Slesinger et al. (2024). Values represent measurements that were taken on or near (≤2 days) the day of sampling for gene expression (condition factors) or calculated between hatch and sampling date (growth and mortality), and are mean±SE across three or four replicate tanks. Values with asterisks (✱) indicate pairwise differences among each treatment and the control (6°C, 360 µatm).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | **Control** | **Acidified** | **Cold** | **Cold + Acidified** | **Warm** | **Warm + Acidified** |
| Target Conditions (temperature, pCO2) | 6°C, 360 µatm | 6°C, 1,560 µatm | 3°C, 360 µatm | 3°C, 1,560 µatm | 10°C, 360 µatm | 10°C, 1,560 µatm |
| Total survival (%) | 23.0 ± 10.4% | 35.1 ± 7.5 ± | 12.1 ± 6.7% | 13.5 ± 2.4% | 5.7 ± 2.1% | 4.1 ± 1.0% |
| Instantaneous daily mortality rate (%) | 0.092 ± 0.01 | 0.053 ± 0.004 | 0.11 ± 0.02 | 0.074 ± 0.003 | 0.24 ± 0.02 ✱ | 0.25 ± 0.01 ✱ |
| Morphometric-based condition factor, KMH | 0.023 ± 0.004 | 0.015 ± 0.004 | -0.020 ± 0.001 ✱ | -0.012 ± 0.001 ✱ | -0.003 ± 0.002 ✱ | -0.008 ± 0.002 ✱ |
| Dry weight-based condition factor, KDW | 1.11 ± 0.02 | 1.08 ± 0.02 | 0.89 ± 0.04 ✱ | 1.05 ± 0.04 | 1.18 ± 0.015 | 1.17 ± 0.023 |
| Growth rate, length-based GL (mm/day) | 0.071 ± 0.002 | 0.075 ± 0.005 | 0.041 ± 0.004 ✱ | 0.046 ± 0.002 ✱ | 0.055 ± 0.007 | 0.062 ± 0.002 |
| Growth rate, mass-based,  GM (%/day) | 4.76 ± 0.29 | 4.75 ± 0.12 | 2.42 ± 0.25 ✱ | 3.34 ± 0.22 ✱ | 2.71 ± 0.36 ✱ | 3.75 ± 0.25 ✱ |