Supplementary Material

# Supplementary Tables

Table S1. Summary of three main hypotheses, sub-hypotheses, statistical tests and variables included in the tests. All tests were univariate, with each dependent variable tested separately.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Timing of samples | Dependent variable | Independent variable | Statistical test |
| Hypothesis 1  Higher OM sediment content will positively affect reproductive endpoints, female nutritional status and condition, and female condition will positively affect reproductive endpoints | Initial | Fecundity, viable embryos (VE), female C:N | Sediment OM (high or low) | t-test |
| End of experiment | Number of juveniles (square root transformed) | Sediment OM (high or low) and female origin (control or transferred) | 2-way ANOVA |
| End of experiment | Juvenile biomass, female C:N, juvenile C:N | Sediment OM (high or low) and female origin (control or transferred) | Kruskal-Wallis |
| Initial | VE | Sediment OM (high or low) and female C:N or female δ15N | Multiple linear regression |
| End of experiment | Number of juveniles | Sediment OM (high or low), female origin (control or transferred) and female C:N | Multiple linear regression |
| End of experiment | Number of juveniles | Female δ15N, Female δ13C | Spearman’s rank correlation |
| Hypothesis 2  OM sediment content will significantly change amphipod trophic niche through changes in resource availability | Initial | Female mean δ13C, female mean δ15N | Sediment OM (high or low) | t-test |
| End of experiment | Female mean δ13C, female mean δ15N, female δ13Ca | Sediment OM (high or low) and female origin (control or transferred) | 2-way ANOVA |
| End of experiment | Female δ15Na, female ED | Sediment OM (high or low) and female origin (control or transferred) | Kruskal-Wallis |
| End of experiment | Juvenile mean δ13C, juvenile mean δ15N | Sediment OM (high or low) and female origin (control or transferred) | 2-way ANOVA |
| Hypothesis 3  Females are not eating, and we expect increased δ13C and δ15N values and decreased C:N ratios from initials to the end of the experiment | Initial, end of experiment | Female δ13C, female δ15N | Time, treatment | 2-way ANOVA |
| Initial, end of experiment | Female C:N | Time | Kruskal-Wallis |
| Hypothesis 4  Female and progenitor offspring isotopes will differ significantly, with higher δ15N in females, and juvenile δ13C matching the sediment δ13C more closely than females | End of experiment | Juvenile δ13C, juvenile δ15N | Female δ13C, female δ15N | t-test |

Table S2. Multiple linear regression models of square root-transformed number of juveniles and proportion of viable embryos (VE).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number of juveniles | | VE | | | VE | | |
| (Intercept) | 4.42 \*\*\* | (0.29) | 93.47 \*\*\* | | (2.08) | 93.52 \*\*\* | | (2.29) |
| End female C:N | -2.02 \*\*\* | (0.47) |  | | |  | | |
| End sediment OM | 0.23 | (0.43) |  | | |  | | |
| End female origin | 1.64 \*\* | (0.51) |  | | |  | | |
| End female C:N:End sediment OM | 2.09 \*\* | (0.76) |  | | |  | | |
| End female C:N:End female origin | 3.18 \*\*\* | (0.88) |  | | |  | | |
| End sediment OM:End female origin | -0.87 | (0.66) |  | | |  | | |
| End female C:N:End sediment OM:End female origin | -3.31 \*\* | (1.08) |  | | |  | | |
| Initial female C:N |  | | -1.39 | (2.15) | |  | | |
| Initial sediment OM |  | | -2.31 | (2.94) | | -1.04 | (3.19) | |
| Initial female C:N:Initial sediment OM |  | | 2.83 | (2.99) | |  | | |
| Initial female δ15N |  | |  | | | -0.34 | (2.49) | |
| Initial female δ15N:Initial sediment OM |  | |  | | | -2.32 | (3.27) | |
| N | 44 | | 30 | | | 30 | | |
| R2 | 0.34 | | -0.054 | | | -0.027 | | |
| All continuous predictors are mean-centered and scaled by 1 standard deviation. \*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05. | | | | | | | | |

# Supplementary Data

Sample type (female – mother, offspring – juvenile, sediment), OM (low or high sediment organic matter content), Cont\_Trans (females control or transferred), and time (initial before the experiment – 1 or end of experiment – 2) refer to the sample identification. Dry weight (g), total carbon (totC), δ13C, total nitrogen (totN) and δ15N for each sample in the experiment. Note that the carbon measurements presented are not corrected for high lipids.

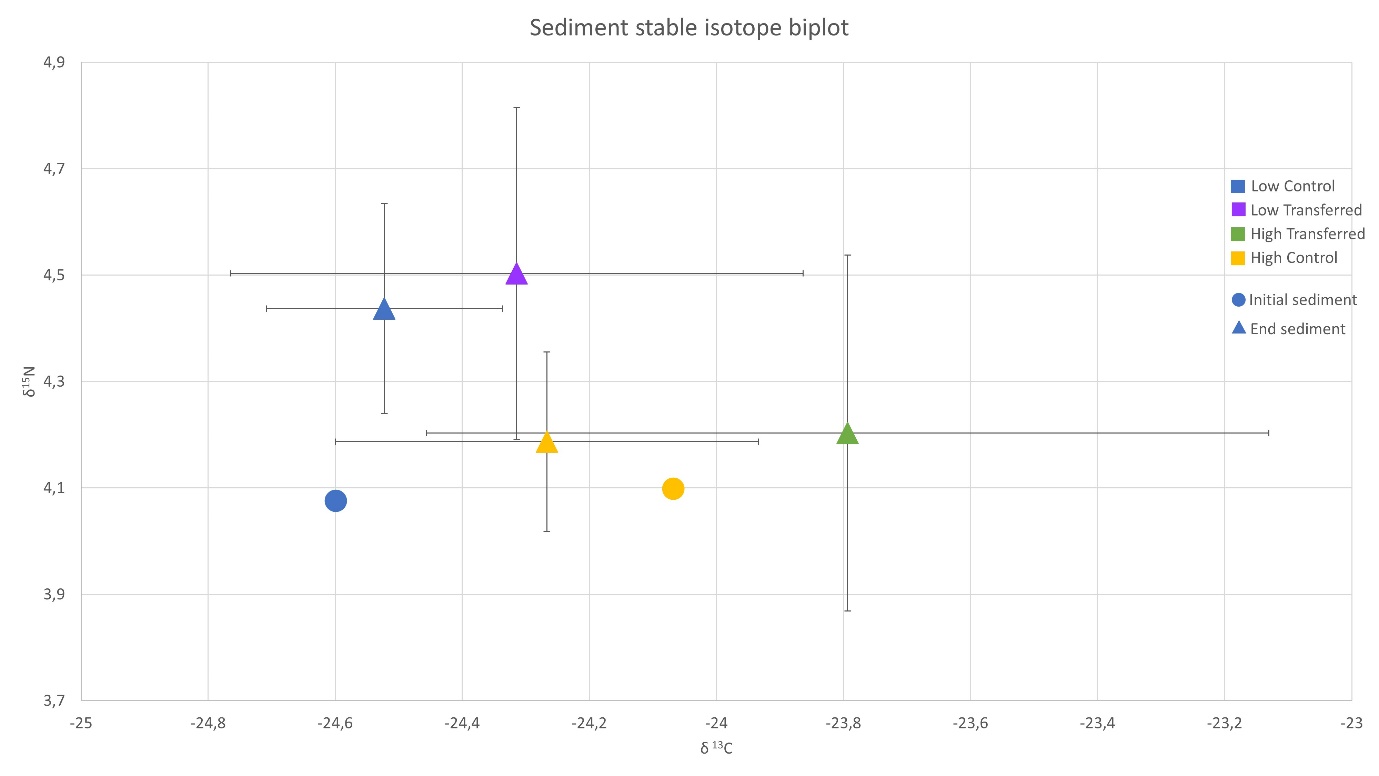
|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sample\_type | OM | Cont\_Trans | Time | Dry\_weight\_g | totC | δ13C | totN | δ15N |
| Mother | Low | Control | 1 | 0.24 | 85.09 | -18.32 | 18.41 | 6.26 |
| Mother | Low | Control | 1 | 0.31 | 98.10 | -18.06 | 20.36 | 5.60 |
| Mother | Low | Control | 1 | 0.51 | 109.32 | -19.67 | 20.64 | 6.73 |
| Mother | Low | Control | 1 | 0.245 | 87.14 | -19.02 | 18.39 | 6.46 |
| Mother | Low | Control | 1 | 0.41 | 120.92 | -18.92 | 24.84 | 7.35 |
| Mother | Low | Control | 1 | 0.36 | 99.66 | -18.08 | 21.01 | 6.01 |
| Mother | Low | Control | 1 | 0.31 | 116.34 | -20.02 | 21.83 | 7.25 |
| Mother | Low | Control | 1 | 0.43 | 111.48 | -19.41 | 20.86 | 6.13 |
| Mother | Low | Control | 1 | 0.22 | 74.90 | -19.24 | 16.43 | 6.86 |
| Mother | Low | Control | 1 | 0.475 | 70.59 | -18.81 | 14.41 | 6.66 |
| Mother | Low | Control | 1 | 0.52 | 103.26 | -19.20 | 20.14 | 6.95 |
| Mother | Low | Control | 1 | 0.38 | 122.07 | -18.98 | 27.93 | 6.89 |
| Mother | Low | Control | 1 | 0.2 | 64.71 | -18.48 | 13.70 | 6.37 |
| Mother | Low | Control | 1 | 0.644 | 133.43 | -19.16 | 27.09 | 6.95 |
| Mother | Low | Control | 1 | 0.58 | 140.58 | -19.41 | 24.61 | 6.40 |
| Mother | High | Control | 1 | 0.3 | 108.95 | -20.24 | 20.89 | 6.44 |
| Mother | High | Control | 1 | 0.29 | 100.89 | -18.79 | 20.69 | 6.23 |
| Mother | High | Control | 1 | 0.51 | 135.02 | -18.78 | 28.04 | 6.42 |
| Mother | High | Control | 1 | 0.33 | 121.77 | -18.45 | 23.86 | 6.50 |
| Mother | High | Control | 1 | 0.28 | 67.50 | -17.77 | 15.44 | 6.02 |
| Mother | High | Control | 1 | 0.3 | 99.56 | -19.57 | 22.85 | 6.10 |
| Mother | High | Control | 1 | 0.2 | 69.10 | -17.81 | 14.92 | 5.34 |
| Mother | High | Control | 1 | 0.33 | 105.46 | -19.02 | 21.92 | 6.62 |
| Mother | High | Control | 1 | 0.35 | 122.14 | -18.72 | 26.55 | 6.37 |
| Mother | High | Control | 1 | 0.37 | 121.02 | -19.76 | 22.86 | 6.94 |
| Mother | High | Control | 1 | 0.44 | 101.29 | -19.68 | 19.93 | 6.32 |
| Mother | High | Control | 1 | 0.37 | 75.52 | -18.43 | 17.36 | 5.73 |
| Mother | High | Control | 1 | 0.12 | 39.59 | -19.07 | 8.65 | 5.70 |
| Mother | High | Control | 1 | 0.23 | 79.59 | -18.75 | 15.46 | 5.88 |
| Mother | High | Control | 1 | 0.51 | 176.92 | -19.46 | 33.15 | 6.16 |
| Mother | High | Control | 2 | 0.29 | 78.84 | -17.16 | 18.35 | 5.83 |
| Mother | High | Control | 2 | 0.32 | 96.86 | -17.59 | 24.20 | 6.49 |
| Mother | High | Control | 2 | 0.35 | 105.68 | -18.07 | 25.45 | 6.65 |
| Mother | High | Control | 2 | 0.3 | 61.16 | -17.32 | 14.46 | 5.38 |
| Mother | High | Control | 2 | 0.46 | 110.79 | -18.67 | 27.08 | 5.82 |
| Mother | Low | Control | 2 | 0.225 | 58.14 | -18.32 | 13.28 | 5.35 |
| Mother | Low | Control | 2 | 0.41 | 129.07 | -19.07 | 27.93 | 7.45 |
| Mother | Low | Control | 2 | 0.32 | 84.05 | -17.81 | 19.99 | 5.65 |
| Mother | Low | Control | 2 | 0.35 | 100.25 | -17.82 | 23.07 | 6.07 |
| Mother | High | Transferred | 2 | 0.39 | 120.95 | -18.61 | 27.88 | 5.83 |
| Mother | High | Transferred | 2 | 0.49 | 107.87 | -17.56 | 24.80 | 6.13 |
| Mother | High | Transferred | 2 | 0.3 | 91.13 | -17.82 | 21.77 | 5.99 |
| Mother | High | Transferred | 2 | 0.36 | 96.63 | -17.51 | 22.44 | 5.54 |
| Mother | High | Transferred | 2 | 0.26 | 73.06 | -19.41 | 17.30 | 5.30 |
| Mother | High | Transferred | 2 | 0.42 | 116.90 | -18.01 | 28.68 | 5.92 |
| Mother | Low | Transferred | 2 | 0.43 | 120.06 | -18.41 | 27.80 | 6.24 |
| Mother | Low | Transferred | 2 | 0.35 | 122.18 | -18.66 | 26.78 | 6.29 |
| Mother | Low | Transferred | 2 | 0.75 | 263.73 | -18.57 | 55.17 | 6.55 |
| Mother | Low | Transferred | 2 | 0.37 | 87.41 | -18.00 | 19.99 | 5.98 |
| Mother | Low | Transferred | 2 | 0.35 | 82.30 | -19.08 | 19.64 | 5.09 |
| Mother | Low | Transferred | 2 | 0.3 | 86.27 | -18.76 | 22.00 | 5.57 |
| Mother | High | Control | 2 | 0.3 | 85.71 | -18.52 | 20.13 | 5.98 |
| Mother | High | Control | 2 | 0.63 | 86.22 | -17.59 | 18.90 | 6.12 |
| Mother | High | Control | 2 | 0.38 | 81.06 | -17.70 | 18.39 | 5.80 |
| Mother | High | Control | 2 | 0.42 | 115.55 | -17.99 | 26.05 | 5.63 |
| Mother | High | Control | 2 | 0.28 | 89.58 | -18.62 | 21.76 | 5.57 |
| Mother | High | Control | 2 | 0.33 | 89.69 | -17.70 | 20.56 | 6.03 |
| Mother | Low | Control | 2 | 0.32 | 92.53 | -17.58 | 22.08 | 5.39 |
| Mother | Low | Control | 2 | 0.31 | 86.52 | -17.66 | 20.05 | 5.57 |
| Mother | Low | Control | 2 | 0.3 | 77.67 | -18.25 | 17.46 | 6.97 |
| Mother | Low | Control | 2 | 0.43 | 110.48 | -18.42 | 26.06 | 6.06 |
| Mother | Low | Control | 2 | 0.2 | 62.18 | -17.91 | 14.93 | 6.06 |
| Mother | High | Transferred | 2 | 0.3 | 93.31 | -18.44 | 22.49 | 5.94 |
| Mother | High | Transferred | 2 | 0.24 | 72.85 | -18.18 | 17.55 | 5.65 |
| Mother | High | Transferred | 2 | 0.32 | 77.80 | -18.42 | 18.27 | 5.86 |
| Mother | High | Transferred | 2 | 0.23 | 64.74 | -18.23 | 15.83 | 5.69 |
| Mother | High | Transferred | 2 | 0.23 | 69.43 | -18.48 | 16.75 | 5.62 |
| Mother | Low | Transferred | 2 | 0.65 | 170.67 | -18.72 | 40.51 | 6.22 |
| Mother | Low | Transferred | 2 | 0.48 | 143.85 | -18.93 | 33.41 | 5.82 |
| Mother | Low | Transferred | 2 | 0.23 | 60.48 | -19.18 | 13.43 | 7.14 |
| Mother | Low | Transferred | 2 | 0.53 | 154.48 | -19.26 | 34.87 | 7.10 |
| Mother | Low | Transferred | 2 | 0.91 | 31.47 | -20.84 | 5.58 | 8.38 |
| Mother | Low | Transferred | 2 | 0.34 | 98.46 | -17.95 | 23.47 | 6.04 |
| Mother | High | Transferred | 2 | 0.385 | 113.97 | -17.73 | 28.03 | 6.40 |
| Juvenile | High | Control | 2 | 0.31 | 102.17 | -18.85 | 23.63 | 6.69 |
| Juvenile | High | Control | 2 | 0.36 | 121.20 | -18.81 | 29.84 | 6.21 |
| Juvenile | High | Control | 2 | 0.62 | 111.10 | -19.15 | 27.94 | 7.11 |
| Juvenile | High | Control | 2 | 0.27 | 103.06 | -19.32 | 25.34 | 7.07 |
| Juvenile | High | Control | 2 | 0.24 | 90.19 | -19.63 | 22.52 | 5.70 |
| Juvenile | Low | Control | 2 | 0.14 | 50.32 | -20.29 | 12.88 | 6.91 |
| Juvenile | Low | Control | 2 | 0.22 | 87.43 | -20.32 | 17.52 | 7.51 |
| Juvenile | Low | Control | 2 | 0.24 | 88.12 | -18.98 | 22.61 | 6.74 |
| Juvenile | Low | Control | 2 | 0.18 | 71.77 | -19.51 | 14.79 | 6.21 |
| Juvenile | Low | Control | 2 | 0.17 | 63.63 | -19.31 | 15.58 | 6.32 |
| Juvenile | High | Transferred | 2 | 0.26 | 100.25 | -20.04 | 21.65 | 6.21 |
| Juvenile | High | Transferred | 2 | 0.25 | 88.76 | -18.42 | 21.02 | 6.55 |
| Juvenile | High | Transferred | 2 | 0.09 | 48.66 | -20.24 | 12.21 | 5.98 |
| Juvenile | High | Transferred | 2 | 0.34 | 125.21 | -19.34 | 31.65 | 6.47 |
| Juvenile | High | Transferred | 2 | 0.45 | 99.89 | -20.19 | 24.85 | 6.59 |
| Juvenile | High | Transferred | 2 | 0.31 | 109.21 | -19.72 | 27.67 | 6.09 |
| Juvenile | Low | Transferred | 2 | 0.27 | 102.91 | -19.76 | 26.11 | 6.38 |
| Juvenile | Low | Transferred | 2 | 0.28 | 101.87 | -19.27 | 26.28 | 6.93 |
| Juvenile | Low | Transferred | 2 | 0.3 | 109.98 | -18.91 | 26.22 | 6.42 |
| Juvenile | Low | Transferred | 2 | 0.29 | 101.24 | -19.65 | 25.83 | 6.15 |
| Juvenile | Low | Transferred | 2 | 0.27 | 96.01 | -20.35 | 23.91 | 5.40 |
| Juvenile | Low | Transferred | 2 | 0.25 | 83.81 | -19.88 | 22.12 | 5.95 |
| Juvenile | High | Control | 2 | 0.27 | 98.28 | -19.09 | 22.60 | 6.97 |
| Juvenile | High | Control | 2 | 0.29 | 103.85 | -18.84 | 26.54 | 6.64 |
| Juvenile | High | Control | 2 | 0.21 | 85.18 | -20.15 | 17.71 | 6.22 |
| Juvenile | High | Control | 2 | 0.34 | 130.68 | -19.26 | 28.49 | 6.64 |
| Juvenile | Low | Control | 2 | 0.29 | 90.53 | -18.55 | 22.57 | 6.64 |
| Juvenile | Low | Control | 2 | 0.25 | 104.07 | -19.85 | 24.40 | 6.68 |
| Juvenile | Low | Control | 2 | 0.25 | 90.22 | -19.82 | 21.99 | 6.28 |
| Juvenile | High | Transferred | 2 | 0.35 | 129.59 | -19.92 | 32.10 | 6.56 |
| Juvenile | High | Transferred | 2 | 0.29 | 105.93 | -20.73 | 24.52 | 7.45 |
| Juvenile | High | Transferred | 2 | 0.23 | 84.74 | -19.71 | 20.98 | 6.41 |
| Juvenile | High | Transferred | 2 | 0.25 | 93.32 | -19.69 | 24.22 | 6.75 |
| Juvenile | High | Transferred | 2 | 0.16 | 59.23 | -19.16 | 13.11 | 7.17 |
| Juvenile | High | Transferred | 2 | 0.39 | 138.30 | -19.36 | 34.83 | 7.36 |
| Juvenile | Low | Transferred | 2 | 0.22 | 82.96 | -19.46 | 18.80 | 6.50 |
| Juvenile | Low | Transferred | 2 | 0.34 | 109.04 | -19.49 | 28.00 | 6.51 |
| Juvenile | Low | Transferred | 2 | 0.3 | 106.76 | -18.27 | 25.53 | 6.46 |
| Juvenile | Low | Transferred | 2 | 0.35 | 116.70 | -19.15 | 29.25 | 6.72 |
| Juvenile | Low | Transferred | 2 | 0.26 | 87.38 | -19.08 | 22.81 | 6.47 |
| Sediment | Low | Control | 1 | 46.32 | 820.27 | -24.60 | 118.21 | 4.08 |
| Sediment | High | Control | 1 | 19.2 | 709.67 | -24.07 | 99.00 | 4.10 |
| Sediment | High | Control | 2 | 12.31 | 507.95 | -24.05 | 74.80 | 4.13 |
| Sediment | High | Control | 2 | 19.3 | 544.29 | -24.03 | 76.51 | 4.28 |
| Sediment | High | Control | 2 | 36.35 | 117.88 | -24.67 | 15.23 | 4.39 |
| Sediment | High | Control | 2 | 40.22 | 236.71 | -24.35 | 33.10 | 4.25 |
| Sediment | High | Control | 2 | 49.78 | 186.68 | -24.54 | 23.38 | 4.12 |
| Sediment | Low | Control | 2 | 30.32 | 221.62 | -24.64 | 29.84 | 4.25 |
| Sediment | Low | Control | 2 | 47.96 | 116.80 | -24.34 | 14.74 | 4.74 |
| Sediment | Low | Control | 2 | 30.75 | 182.86 | -24.51 | 24.99 | 4.18 |
| Sediment | Low | Control | 2 | 39.76 | 124.91 | -24.94 | 16.31 | 4.57 |
| Sediment | Low | Control | 2 | 48.76 | 114.05 | -24.48 | 14.48 | 4.74 |
| Sediment | High | Transferred | 2 | 49.65 | 276.74 | -23.46 | 38.63 | 4.08 |
| Sediment | High | Transferred | 2 | 36.06 | 148.97 | -24.15 | 19.18 | 4.95 |
| Sediment | High | Transferred | 2 | 40.3 | 189.81 | -24.09 | 23.85 | 3.86 |
| Sediment | High | Transferred | 2 | 48.96 | 146.12 | -24.65 | 19.26 | 4.69 |
| Sediment | High | Transferred | 2 | 35.92 | 150.72 | -23.80 | 19.15 | 4.00 |
| Sediment | High | Transferred | 2 | 38.24 | 172.14 | -22.83 | 20.57 | 4.35 |
| Sediment | Low | Transferred | 2 | 45.76 | 121.09 | -23.74 | 14.02 | 4.37 |
| Sediment | Low | Transferred | 2 | 40.03 | 140.22 | -23.56 | 17.54 | 4.38 |
| Sediment | Low | Transferred | 2 | 54.62 | 135.88 | -24.21 | 18.21 | 4.54 |
| Sediment | Low | Transferred | 2 | 48.42 | 110.37 | -24.37 | 14.31 | 4.84 |
| Sediment | Low | Transferred | 2 | 40.61 | 101.09 | -25.03 | 12.06 | 3.93 |
| Sediment | Low | Transferred | 2 | 50.94 | 144.84 | -24.68 | 17.72 | 4.33 |
| Sediment | High | Control | 2 | 44.74 | 159.22 | -24.34 | 21.06 | 4.14 |
| Sediment | High | Control | 2 | 35.8 | 109.50 | -24.48 | 14.09 | 4.42 |
| Sediment | High | Control | 2 | 54.09 | 170.53 | -23.67 | 20.16 | 3.84 |
| Sediment | High | Control | 2 | 36.57 | 180.87 | -24.53 | 24.19 | 4.10 |
| Sediment | High | Control | 2 | 40.43 | 224.04 | -23.78 | 30.09 | 4.06 |
| Sediment | High | Control | 2 | 47.67 | 105.74 | -24.49 | 13.92 | 4.33 |
| Sediment | Low | Control | 2 | 44.91 | 155.24 | -24.35 | 20.83 | 4.48 |
| Sediment | Low | Control | 2 | 34.57 | 207.34 | -24.49 | 28.05 | 4.39 |
| Sediment | Low | Control | 2 | 31.5 | 176.48 | -24.52 | 24.18 | 4.36 |
| Sediment | Low | Control | 2 | 34.97 | 162.50 | -24.64 | 21.83 | 4.24 |
| Sediment | Low | Control | 2 | 44.3 | 169.51 | -24.32 | 22.58 | 4.41 |
| Sediment | High | Transferred | 2 | 53.37 | 185.84 | -24.23 | 24.13 | 4.10 |
| Sediment | High | Transferred | 2 | 37.73 | 235.27 | -23.81 | 32.46 | 3.87 |
| Sediment | High | Transferred | 2 | 53.15 | 244.51 | -22.27 | 31.87 | 4.32 |
| Sediment | High | Transferred | 2 | 36.16 | 204.60 | -24.10 | 26.25 | 4.12 |
| Sediment | High | Transferred | 2 | 53.02 | 176.58 | -24.27 | 22.73 | 3.88 |
| Sediment | High | Transferred | 2 | 35.43 | 203.03 | -23.85 | 28.76 | 4.23 |
| Sediment | Low | Transferred | 2 | 48.27 | 118.06 | -24.23 | 15.48 | 4.44 |
| Sediment | Low | Transferred | 2 | 53.61 | 160.50 | -24.13 | 19.63 | 4.54 |
| Sediment | Low | Transferred | 2 | 56.21 | 92.32 | -23.84 | 15.38 | 5.23 |
| Sediment | Low | Transferred | 2 | 44.05 | 218.71 | -24.74 | 29.07 | 4.42 |
| Sediment | Low | Transferred | 2 | 34.47 | 106.91 | -24.79 | 15.09 | 4.61 |
| Sediment | Low | Transferred | 2 | 55.45 | 193.22 | -24.44 | 25.49 | 4.41 |

# Supplementary Figures

 **Supplementary Figure S1.** Fecundity (left, number of eggs per female) and percent viable embryos (VE) per female (right) for the initial females between the two stations, blue low OM station 6019, and yellow high OM station 6022.



**Supplementary Figure S2.** Number of juveniles recovered per female at experiment termination (end) per female *M. affinis* for each treatment; blue Low Control, purple Low Transferred, green High Transferred, and yellow High Control. Experimental treatments were set up as follows: low OM amphipods were kept in low OM sediment (Low Control; blue); high OM amphipods were transplanted into low OM sediment (Low Transferred; purple); low OM amphipods were transplanted into high OM sediment (High Transferred; green); and high OM amphipods were kept in high OM sediment (High Control; yellow).



**Supplementary Figure S3.** Stable isotope biplot (δ13C and δ15N) of the sediment used in the experiment, in which the initial samples are represented by circles and end of experiment samples are represented by squares. Experimental treatments were set up as follows: low OM amphipods were kept in low OM sediment (Low Control; blue); high OM amphipods were transplanted into low OM sediment (Low Transferred; purple); low OM amphipods were transplanted into high OM sediment (High Transferred; green); and high OM amphipods were kept in high OM sediment (High Control; yellow).