**Electronic Supplementary Material**

Title: “Invasion-mediated effects on marine trophic interactions in a changing climate: positive feedbacks favour kelp persistence

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**Table S1** Average (± SD, *n* = 5 experiments) seawater conditions in the mesocosms. Data include water temperature (T) and salinity (ppm).

|  |  |  |  |
| --- | --- | --- | --- |
| **Treatment** | **T (° C)** | **Salinity (ppm)** | |
| 23 °C & Invaded | 23.07±0.09 | | 32.88±0.09 |
| 26 °C & Invaded | 25.94±0.03 | | 33.99±0.05 |
| 23 °C & Non-Invaded | 23.01±0.16 | | 32.90±0.11 |
| 26 °C & Non-Invaded | 26.06±0.15 | | 33.90±0.08 |

**Table S2** Summary of GLMs for weight and photosynthetic yield of native algae autogenic controls in temperature (23 °C and 26 °C) and invasion (invaded and non-invaded) treatments: a-b) *Ecklonia radiata* and c-d) *Sargassum* *vestitum*.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (a) *Ecklonia radiata* (weight) | | | | | |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 19 | 0.2149 |  |  |
| Temperature | 1 | 0.0281 | 18 | 0.1867 | 0.1176 |  |
| Invasion | 1 | 0.0022 | 17 | 0.1845 | 0.6612 |  |
| Temperature x Invasion | 1 | 0.0008 | 16 | 0.1837 | 0.7862 |  |
| (b) *Ecklonia radiata* (photosynthetic yield) | | | | | |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 19 | 0.0159 |  |  |
| Temperature | 1 | 0.0060 | 18 | 0.0098 | <0.0001 | \*\*\* |
| Invasion | 1 | 0.0011 | 17 | 0.0087 | 0.0605 |  |
| Temperature x Invasion | 1 | 0.0037 | 16 | 0.0050 | 0.0005 | \*\*\* |
| (c) *Sargassum vestitum* (weight) | | | | | |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 19 | 169.8204 |  |  |
| Temperature | 1 | 39.3121 | 18 | 130.5101 | 0.0267 | \* |
| Invasion | 1 | 2.3672 | 17 | 128.1401 | 0.5867 |  |
| Temperature x Invasion | 1 | 0.0023 | 16 | 128.1402 | 0.9873 |  |
|  |  |  |  |  |  |  |
| (d) *Sargassum* *vestitum* (photosynthetic yield) | | | | | |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 19 | 0.1100 |  |  |
| Temperature | 1 | 0.0109 | 18 | 0.0990 | 0.1819 |  |
| Invasion | 1 | 0.0000 | 17 | 0.0990 | 0.9705 |  |
| Temperature x Invasion | 1 | 0.0002 | 16 | 0.0987 | 0.8443 |  |

**Table S3** Summary of GLMs for algal biomass consumed by *Turbo militaris* in temperature (23 °C and 26 °C) and invasion (invaded and non-invaded) conditions for *Ecklonia radiata* (a) and *Sargassum vestitum* (b). \* = significant results.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (a) *Ecklonia radiata* | | |  |  |  |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr(>Chi)** |  |
| NULL |  |  | 19 | 22.9854 |  |  |
| Temperature | 1 | 6.8441 | 18 | 16.1413 | 0.0010 | \* |
| Invasion | 1 | 1.5122 | 17 | 14.6292 | 0.1383 |  |
| Temperature × Invasion | 1 | 3.6123 | 16 | 11.0163 | 0.0210 | \* |
|  |  |  |  |  |  |  |
| (b) *Sargassum* *vestitum* |  |  |  |  |  |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr(>Chi)** |  |
| NULL |  |  | 19 | 130.8650 |  |  |
| Temperature | 1 | 82.8250 | 18 | 48.0410 | 0.0010 | \* |
| Invasion | 1 | 0.0600 | 17 | 47.9810 | 0.8860 |  |
| Temperature × Invasion | 1 | 0.4800 | 16 | 47.5000 | 0.6870 |  |

**Table S4** Summary of GLMs for photosynthetic yield of algae in herbivory treatment in temperature (23 °C and 26 °C) and invasion (invaded and non-invaded) treatments: a) *Ecklonia radiata* and b) *Sargassum* *vestitum*.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| (a) *Ecklonia radiata* |  |  |  |  |  |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 16 | 0.0171 |  |  |
| Temperature | 1 | 0.0000 | 15 | 0.0173 | 0.6201 |  |
| Invasion | 1 | 0.0010 | 14 | 0.0152 | 0.1491 |  |
| Temperature x Invasion | 1 | 0.0030 | 13 | 0.0120 | 0.0642 |  |
|  |  |  |  |  |  |  |
| (b) *Sargassum vestitum* |  |  |  |  |  |  |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr (>Chi)** |  |
| NULL |  |  | 19 | 0.0351 |  |  |
| Temperature | 1 | 0.0011 | 18 | 0.0332 | 0.3311 |  |
| Invasion | 1 | 0.0002 | 17 | 0.0321 | 0.5741 |  |
| Temperature x Invasion | 1 | 0.0022 | 16 | 0.0304 | 0.2832 |  |

**Table S5** Summary of GLMs of *Turbo militaris* bites on dental wax in Temperature (23 °C and 26 °C) and invasion (invaded and non-invaded) conditions. \* = significant results.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **Df** | **Deviance Resid.** | **Df** | **Resid. Dev** | **Pr(>Chi)** |  |
| NULL |  |  | 19 | 11193.8000 |  |  |
| Temperature | 1 | 3001.2000 | 18 | 8192.5000 | <0.0010 | \* |
| Invasion | 1 | 4961.2000 | 17 | 3231.2000 | <0.0010 | \* |
| Temperature × Invasion | 1 | 281.2000 | 16 | 2950.0000 | 0.2160 |  |

**Table S6** Hotelling *T*2 test effects of temperature and species on snail feeding preference of herbivory treatments.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Effect** | **Value** | **F** | **Df** | **P** |  |
| Temperature | 0.1040 | 0.5220 | 1 | 0.5020 |  |
| Species | 15.0090 | 30.0170 | 2 | 0.0040 | \* |
| Temperature × Species | 0.0490 | 0.9800 | 2 | 0.9090 |  |

**Table S7** Summary of Kruskal-Wallis test of *Caulerpa filiformis* weight loss in treatments (herbivory and control).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Effect** | **Df** | **Sum sq** | **Mean sq** | **F value** | **Pr(>F)** |  |
| *Caulerpa* treatment | 1 | 7.8320 | 7.8320 | 3.4521 | 0.0709 |  |
| Residuals | 38 | 86.2180 | 2.2680 |  |  |  |