Supplementary material – Online Resource 1

**Invading bivalves replaced the native Levantine populations with negligible local effects on the benthic community**

Rei Diga1,2, Merav Gilboa1, Raz Moskovich1,2, Neomie Darmon1, Tal Amit1,2 Jonathan Belmaker2,3, Gitai Yahel1

1- Faculty of Marine Sciences, Ruppin Academic Center, Michmoret, 402970, Israel

2- School of Zoology, George S. Wise Faculty of Life Sciences, Tel-Aviv University, Tel Aviv 6997801, Israel

3- Steinhardt Museum of Natural History, Tel-Aviv University, Tel Aviv 6997801, Israel

Corresponding author E-mail address: [diga.boker@gmail.com](mailto:diga.boker@gmail.com)

S1. Substrate, algae, and invertebrates (>1 cm) categories that were used during the SCUBA surveys along the rocky subtidal outcrops. Invertebrates were classified to high-level taxonomic grouping (phylum or class) to ensure consistency and avoid misidentification problems between samplers.

|  |  |
| --- | --- |
| **Group** | **Category** |
| Substrate | Bare rock |
| Rock cover with loose sediment |
| Algae | Algae |
| Invertebrates | Bivalvia |
| Bryozoa |
| Cnidaria |
| Crustacea |
| Gastropoda |
| Porifera |
| Tunicata |
| Unidentified |

S2. Algal growth rates in the three treatments (µg Chl-*a* m-2 day-1, mean ± 95% CI) in four experiments deployed during spring 2020, fall 2020, and spring 2021.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Deployment date** | **Duration (days)** | **Control** | **Poison** | **Removal** | **N** |
| 24/02/2020 | 41 | 43.8 ± 15.7 | 34.9 ± 11.3 | 43.6 ± 13 | 8,8,8 |
| 05/05/2020 | 22 | 12.5 ± 3.9 | 12.5 ± 3.9 | 16.2 ± 6.2 | 8,8,8 |
| 15/09/2020 | 22 | 100.8 ± 25 | 97.5 ± 29.9 | 99.7 ± 31.6 | 16,16,16 |
| 19/04/2021 | 22 | 129.7 ± 75.2 | 100.6 ± 23.1 | 196.1 ± 137.7 | 16,15,16 |

A picture containing text, ocean floor

Description automatically generated  
S3. Major macroalgae that were encountered in the experiment site (Gdor, Israel): **a-b** June-July of 2020 when seasonal algae such as *Cladophora* spp. (pale green filaments) and *Padina* spp. (white circular algae) proliferate and create dense meadows. **c** November 2020 when *Asparagopsis* sp. (pink with ramified thallus) proliferated and created dense meadows. **d** Settlement plate to measure macroalgal growth rate attached to the northeast peg of an experimental plot with the green mesh installed to exclude large grazers such as fish or urchins.

S4. Substrate type and algae genera categories that were used for the identification of algae in the photo-quadrat surveys. Identification was made using a designated `source` in the `CoralNet` platform (<https://coralnet.ucsd.edu/>; source name: Algal composition Michmoret).

|  |  |
| --- | --- |
| **Group** | **Category** |
| Substrate | Bare rock |
| Rock cover with loose sediment |
| Invertebrate | Sessile invertebrates |
| Algae | Asparagopsis |
| Cladophora |
| Codium |
| Dictyoya |
| Ellisolandia |
| Halymenia |
| Jania |
| Lobophora |
| Padina |
| Crustose coralline algae |
| Spatoglossum |
| Taonia |
| Turf |
| Other |
| Acetabularia |
| Colpomenia |
| Gracilaria |
| Rhodymenia |

S5. Summary statistics of the invertebrates abundance in the three surveys of the experimental plots (July 2020, November 2020, and April 2021). Values are the mean, total observations, and the number of occurrences of each taxon in each treatment. n=16 plots in each treatment.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Month** | **Taxon** | **Mean Control** | **Mean Poison** | **Mean Removal** | **Total obs. Control** | **Total obs. Poison** | **Total obs. Removal** | **Occurrence Control** | **Occurrence Poison** | **Occurrence Removal** |
| Jul-20 | *Aglaophenia* sp. | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Jul-20 | Anomura | 0.44 | 0.5 | 0.75 | 7 | 8 | 12 | 3 | 6 | 7 |
| Jul-20 | *Aplysia dactylomela* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | Ascidian 1 | 1.69 | 1.25 | 1.06 | 27 | 20 | 17 | 11 | 10 | 8 |
| Jul-20 | *Botrylloides leachii* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Jul-20 | *Botrylloides* sp. | 1.31 | 0.62 | 0.56 | 21 | 10 | 9 | 8 | 4 | 6 |
| Jul-20 | Bryozoa 2 | 0.25 | 0.12 | 0.38 | 4 | 2 | 6 | 3 | 1 | 5 |
| Jul-20 | Bryozoa 3 | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Jul-20 | *Bugula neritina* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Calcaronea* | 0.62 | 0.69 | 0.5 | 10 | 11 | 8 | 9 | 9 | 8 |
| Jul-20 | *Calcaronea 2* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Cerithium* sp. | 0.25 | 0.38 | 0.25 | 4 | 6 | 4 | 3 | 3 | 3 |
| Jul-20 | *Chondrosia* sp. | 0.25 | 0.06 | 0.12 | 4 | 1 | 2 | 2 | 1 | 1 |
| Jul-20 | *Clathrina* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Coryphellina rubrolineata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Crambe crambe* | 0.06 | 0.12 | 0.06 | 1 | 2 | 1 | 1 | 1 | 1 |
| Jul-20 | *Cystodytes* sp. purple | 1.44 | 1.31 | 1.25 | 23 | 21 | 20 | 7 | 8 | 5 |
| Jul-20 | *Didemnum* orange | 0.06 | 0.62 | 0.19 | 1 | 10 | 3 | 1 | 4 | 2 |
| Jul-20 | *Didemnum* white | 0.06 | 0.06 | 0.19 | 1 | 1 | 3 | 1 | 1 | 2 |
| Jul-20 | *Dysidea* sp. | 0.31 | 0.56 | 0.56 | 5 | 9 | 9 | 4 | 6 | 5 |
| Jul-20 | *Ecteinascidia thurstoni* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Goniobranchus obsoletus* | 0.19 | 0 | 0 | 3 | 0 | 0 | 1 | 0 | 0 |
| Jul-20 | *Halocordyle* sp. | 0.56 | 0.06 | 0.56 | 9 | 1 | 9 | 3 | 1 | 5 |
| Jul-20 | *Herdmania momus* | 0.12 | 0.19 | 0.25 | 2 | 3 | 4 | 2 | 3 | 4 |
| Jul-20 | *Hermodice carunculata* | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Jul-20 | *Hypselodoris infucata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Levantiniella levantinensis* | 0 | 0 | 0.12 | 0 | 0 | 2 | 0 | 0 | 2 |
| Jul-20 | *Liosina blastifera* | 1 | 0.81 | 1.06 | 16 | 13 | 17 | 9 | 6 | 8 |
| Jul-20 | *Macrorhynchia* sp. | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Jul-20 | *Microcosmus exasperatus* | 0.19 | 0.38 | 0.19 | 3 | 6 | 3 | 2 | 5 | 3 |
| Jul-20 | *Mycale* sp. | 0.12 | 0.06 | 0 | 2 | 1 | 0 | 2 | 1 | 0 |
| Jul-20 | Ophiuroidea | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Jul-20 | Other | 1.12 | 1 | 0.62 | 18 | 16 | 10 | 10 | 8 | 6 |
| Jul-20 | *Phallusia nigra* | 0.12 | 0.25 | 0.06 | 2 | 4 | 1 | 2 | 4 | 1 |
| Jul-20 | *Phidiana militaris* | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Jul-20 | *Pycnocalvella communis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Pyura dura* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Sabella* sp. | 0.12 | 0.19 | 0.31 | 2 | 3 | 5 | 2 | 2 | 2 |
| Jul-20 | *Sarcotragus* sp. | 0.31 | 0.19 | 0.25 | 5 | 3 | 4 | 5 | 3 | 4 |
| Jul-20 | *Schizoporella errata* | 0.19 | 0.25 | 0.19 | 3 | 4 | 3 | 3 | 3 | 3 |
| Jul-20 | *Serpula* sp. | 2.81 | 3.38 | 2.31 | 45 | 54 | 37 | 14 | 15 | 14 |
| Jul-20 | Sponge 2 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Jul-20 | Sponge 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Jul-20 | *Styela canopus* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Jul-20 | *Symplegma bahraini* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Jul-20 | *Tethya aurantium* | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Jul-20 | Unidentified bryozoa | 0.12 | 0.12 | 0 | 2 | 2 | 0 | 1 | 2 | 0 |
| Jul-20 | Unidentified sponge | 0.06 | 0.06 | 0.31 | 1 | 1 | 5 | 1 | 1 | 4 |
| Jul-20 | Unidentified tunicata | 0.19 | 0.19 | 0 | 3 | 3 | 0 | 3 | 3 | 0 |
| Nov-20 | *Aglaophenia* sp. | 0.19 | 0.19 | 0 | 3 | 3 | 0 | 3 | 3 | 0 |
| Nov-20 | Anomura | 0.25 | 0.25 | 0.31 | 4 | 4 | 5 | 3 | 3 | 3 |
| Nov-20 | *Aplysia dactylomela* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Ascidian 1 | 1.94 | 1.62 | 1.19 | 31 | 26 | 19 | 12 | 12 | 10 |
| Nov-20 | *Botrylloides leachii* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Nov-20 | *Botrylloides* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Bryozoa 2 | 0 | 0.06 | 0.19 | 0 | 1 | 3 | 0 | 1 | 3 |
| Nov-20 | Bryozoa 3 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Nov-20 | *Bugula neritina* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Calcaronea* | 1.75 | 1.31 | 1 | 28 | 21 | 16 | 13 | 10 | 6 |
| Nov-20 | *Calcaronea 2* | 0 | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 |
| Nov-20 | *Cerithium* sp. | 1.44 | 0.88 | 1.69 | 23 | 14 | 27 | 7 | 6 | 10 |
| Nov-20 | *Chondrosia* sp. | 0.12 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 |
| Nov-20 | *Clathrina* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Coryphellina rubrolineata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Crambe* | 0.12 | 0.06 | 0 | 2 | 1 | 0 | 2 | 1 | 0 |
| Nov-20 | *Cystodytes* sp. *purple* | 1.44 | 1.94 | 1.06 | 23 | 31 | 17 | 7 | 7 | 6 |
| Nov-20 | *Didemnum orange* | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Nov-20 | *Didemnum white* | 0.12 | 0.06 | 0.12 | 2 | 1 | 2 | 2 | 1 | 2 |
| Nov-20 | *Dysidea* sp. | 0.19 | 0.19 | 0.19 | 3 | 3 | 3 | 3 | 2 | 2 |
| Nov-20 | *Ecteinascidia thurstoni* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Goniobranchus obsoletus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Halocordyle* sp. | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Nov-20 | *Herdmania momus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Hermodice carunculata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Hypselodoris infucata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Levantiniella levantinensis* | 0.25 | 0.12 | 0.12 | 4 | 2 | 2 | 4 | 2 | 2 |
| Nov-20 | *Liosina blastifera* | 1.56 | 1.75 | 1.25 | 25 | 28 | 20 | 14 | 11 | 10 |
| Nov-20 | *Macrorhynchia* sp. | 0.06 | 0.12 | 0.12 | 1 | 2 | 2 | 1 | 1 | 1 |
| Nov-20 | *Microcosmus exasperatus* | 0.19 | 0.06 | 0.25 | 3 | 1 | 4 | 2 | 1 | 4 |
| Nov-20 | *Mycale* sp. | 0 | 0.38 | 0.12 | 0 | 6 | 2 | 0 | 3 | 1 |
| Nov-20 | *Ophiuroidea* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Phallusia nigra* | 0.25 | 0.69 | 0.12 | 4 | 11 | 2 | 3 | 7 | 2 |
| Nov-20 | *Phidiana militaris* | 0.12 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 |
| Nov-20 | *Pycnocalvella communis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | *Pyura dura* | 0.12 | 0.31 | 0.31 | 2 | 5 | 5 | 2 | 4 | 5 |
| Nov-20 | *Sabella* sp. | 0.75 | 0.5 | 0.44 | 12 | 8 | 7 | 6 | 3 | 4 |
| Nov-20 | *Sarcotragus* sp. | 0.38 | 0.12 | 0.31 | 6 | 2 | 5 | 6 | 2 | 5 |
| Nov-20 | *Schizoporella errata* | 0.06 | 0.12 | 0.06 | 1 | 2 | 1 | 1 | 2 | 1 |
| Nov-20 | *Serpula* sp. | 2.06 | 3 | 1.62 | 33 | 48 | 26 | 13 | 14 | 13 |
| Nov-20 | Sponge 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Sponge 3 | 0.19 | 0.06 | 0.19 | 3 | 1 | 3 | 3 | 1 | 3 |
| Nov-20 | *Styela canopus* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Nov-20 | *Symplegma bahraini* | 0.5 | 0.06 | 0 | 8 | 1 | 0 | 3 | 1 | 0 |
| Nov-20 | *Tethya aurantium* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Unidentified bryozoa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nov-20 | Unidentified sponge | 0.62 | 0.56 | 0.75 | 10 | 9 | 12 | 9 | 7 | 9 |
| Nov-20 | Unidentified tunicata | 0.06 | 0.12 | 0.06 | 1 | 2 | 1 | 1 | 2 | 1 |
| Apr-21 | *Aglaophenia* sp. | 0.88 | 0.94 | 0.69 | 14 | 15 | 11 | 13 | 12 | 11 |
| Apr-21 | *Anomura* | 0.31 | 0.38 | 0 | 5 | 6 | 0 | 4 | 5 | 0 |
| Apr-21 | *Aplysia dactylomela* | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Apr-21 | *Ascidian 1* | 1.44 | 1.06 | 0.56 | 23 | 17 | 9 | 11 | 11 | 5 |
| Apr-21 | *Botrylloides leachii* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Botrylloides* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | Bryozoa 2 | 0.44 | 0.5 | 0.25 | 7 | 8 | 4 | 6 | 6 | 3 |
| Apr-21 | Bryozoa 3 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Apr-21 | *Bugula neritina* | 0.44 | 0.38 | 0.44 | 7 | 6 | 7 | 7 | 6 | 7 |
| Apr-21 | *Calcaronea* | 3.31 | 5.06 | 2.44 | 53 | 81 | 39 | 14 | 12 | 12 |
| Apr-21 | *Calcaronea 2* | 0.44 | 0.25 | 0.12 | 7 | 4 | 2 | 5 | 3 | 2 |
| Apr-21 | *Cerithium* sp. | 0.12 | 0.19 | 0.31 | 2 | 3 | 5 | 2 | 3 | 3 |
| Apr-21 | *Chondrosia* sp. | 0.06 | 0 | 0.06 | 1 | 0 | 1 | 1 | 0 | 1 |
| Apr-21 | *Clathrina* sp. | 1.94 | 2.06 | 1.06 | 31 | 33 | 17 | 10 | 10 | 9 |
| Apr-21 | *Coryphellina rubrolineata* | 0 | 0.12 | 0.06 | 0 | 2 | 1 | 0 | 2 | 1 |
| Apr-21 | *Crambe* | 0.06 | 0.19 | 0.06 | 1 | 3 | 1 | 1 | 2 | 1 |
| Apr-21 | *Cystodytes* sp. *purple* | 2.06 | 1.88 | 1.38 | 33 | 30 | 22 | 8 | 11 | 6 |
| Apr-21 | *Didemnum orange* | 0 | 0.44 | 0.12 | 0 | 7 | 2 | 0 | 2 | 2 |
| Apr-21 | *Didemnum white* | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Apr-21 | *Dysidea* sp. | 0.31 | 0.69 | 0.19 | 5 | 11 | 3 | 4 | 8 | 3 |
| Apr-21 | *Ecteinascidia thurstoni* | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Apr-21 | *Goniobranchus obsoletus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Halocordyle* sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Herdmania momus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Hermodice carunculata* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Hypselodoris infucata* | 0 | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 |
| Apr-21 | *Levantiniella levantinensis* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Liosina blastifera* | 0.75 | 0.38 | 0.44 | 12 | 6 | 7 | 8 | 4 | 4 |
| Apr-21 | *Macrorhynchia* sp. | 0 | 0 | 0.56 | 0 | 0 | 9 | 0 | 0 | 2 |
| Apr-21 | *Microcosmus exasperatus* | 0.19 | 0.06 | 0 | 3 | 1 | 0 | 2 | 1 | 0 |
| Apr-21 | *Mycale* sp. | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Apr-21 | *Ophiuroidea* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | Other | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Phallusia nigra* | 0.06 | 0.25 | 0.06 | 1 | 4 | 1 | 1 | 3 | 1 |
| Apr-21 | *Phidiana militaris* | 0.19 | 0 | 0.12 | 3 | 0 | 2 | 3 | 0 | 2 |
| Apr-21 | *Pycnocalvella communis* | 0 | 0.19 | 0.31 | 0 | 3 | 5 | 0 | 2 | 4 |
| Apr-21 | *Pyura dura* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Sabella* sp. | 1.19 | 0.94 | 0.88 | 19 | 15 | 14 | 4 | 8 | 6 |
| Apr-21 | *Sarcotragus* sp. | 0.12 | 0.06 | 0.06 | 2 | 1 | 1 | 2 | 1 | 1 |
| Apr-21 | *Schizoporella errata* | 0.06 | 0.12 | 0.06 | 1 | 2 | 1 | 1 | 2 | 1 |
| Apr-21 | *Serpula* sp. | 2 | 2.38 | 1.31 | 32 | 38 | 21 | 15 | 15 | 12 |
| Apr-21 | Sponge 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | Sponge 3 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Apr-21 | *Styela canopus* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Apr-21 | *Symplegma bahraini* | 0 | 0 | 0.06 | 0 | 0 | 1 | 0 | 0 | 1 |
| Apr-21 | *Tethya aurantium* | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Apr-21 | Unidentified bryozoa | 0.12 | 0 | 0.06 | 2 | 0 | 1 | 2 | 0 | 1 |
| Apr-21 | Unidentified sponge | 0.12 | 0.19 | 0.12 | 2 | 3 | 2 | 2 | 2 | 2 |
| Apr-21 | Unidentified tunicata | 0.06 | 0.06 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |

S6. The substrate, algae and invertebrates categories used during PIM surveys in the treatment plots.

|  |  |
| --- | --- |
| **Group** | **Category** |
| Substrate | Bare rock |
| Rock cover with loose sediment |
| Algae | CCA |
| Algae < 2 cm |
| Algae > 2 cm |
| Invertebrates | Bivalvia |
| Bryozoa |
| Cnidaria |
| Crustacea |
| Gastropoda |
| Polychaeta |
| Porifera |
| Tunicata colony |
| Tunicata solitary |
| Unidentified |

Chart, box and whisker chart

Description automatically generatedS7. Comparison of algae growth rates in poison (blue) and removal (red) treatments to the growth rate of the controls. Data are presented as the mean ± 95% CI of the log of the ratio of the treatment growth rate to the control of the same triplet. Means were calculated across all seasons. Black horizontal line represents the expected log of the ratio assuming no treatment effects (no difference between the treatment and the control). \*- represents difference from control (Friedman test, *p* = 0.04).

Chart, scatter chart

Description automatically generated S8. nMDS ordinations of the macroalgae community in five different surveys. A. Colors represent the treatments: control (yellow), poisoning (blue), and removal (red). Black symbols represent the centroids of each month. B. Colors represent the months during which the survey was conducted. Data was log transformed and the similarity matrix was calculated using Bray Curtis index. k=2.

##### S9. Summary of SIMPER analysis of dissimilarities in the macroalgae community between three treatments (poison, removal, and control). On top left is the total average dissimilarity (%) between paired groups and below is the component of the analysis: average abundance in each group, average contribution (%) for the dissimilarity between groups, the consistency of a species contribution (average to Sd ratio), average contribution to the total dissimilarity, and cumulative contributors to dissimilarity (with a 95% cutoff).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Groups Poison & Removal** | | |  |  | |  | |  | |
| Average dissimilarity = 20.38 | | |  |  | |  | |  | |
|  | Group Poison | Group Removal |  |  | |  | |  | |
| **Species** | **Av.Abund** | **Av.Abund** | **Av.Diss** | **Diss/SD** | | **Contrib%** | | **Cum.%** | |
| Turf | 81.31 | 79.68 | 7.95 | 1.14 | | 39.02 | | 39.02 | |
| Cldph | 2.36 | 3.03 | 2.57 | 0.45 | | 12.61 | | 51.63 | |
| AspaTax | 2.49 | 2.42 | 2.41 | | 0.36 | | 11.82 | | 63.44 | |
| Jania | 3.74 | 3.28 | 2.26 | 1.04 | | 11.11 | | 74.55 | |
| Padina | 1.74 | 2.71 | 2.04 | 0.57 | | 10 | | 84.55 | |
| Ellis | 1.8 | 1.49 | 1.53 | 0.52 | | 7.49 | | 92.05 | |
| Cod | 0.23 | 1.9 | 1.05 | 0.39 | | 5.14 | | 97.19 | |
| **Groups Poison & Control** | | |  |  | |  | |  | |
| Average dissimilarity = 25.56 | | |  |  | |  | |  | |
|  | Group Poison | Group Control |  |  | |  | |  | |
| **Species** | **Av.Abund** | **Av.Abund** | **Av.Diss** | **Diss/SD** | | **Contrib%** | | **Cum.%** | |
| Turf | 81.31 | 72.06 | 10 | 1.09 | | 39.13 | | 39.13 | |
| AspaTax | 2.49 | 6.81 | 4.49 | 0.45 | | 17.55 | | 56.68 | |
| Cldph | 2.36 | 4.9 | 3.48 | 0.46 | | 13.62 | | 70.3 | |
| Jania | 3.74 | 5.39 | 2.84 | 1.02 | | 11.12 | | 81.43 | |
| Padina | 1.74 | 2.79 | 2.09 | 0.53 | | 8.17 | | 89.59 | |
| Ellis | 1.8 | 2.19 | 1.82 | 0.61 | | 7.11 | | 96.7 | |
| **Groups Removal & Control** | | |  |  | |  | |  | |
| Average dissimilarity = 26.87 | | |  |  | |  | |  | |
|  | Group Removal | Group Control |  |  | |  | |  | |
| **Species** | **Av.Abund** | **Av.Abund** | **Av.Diss** | **Diss/SD** | | **Contrib%** | | **Cum.%** | |
| Turf | 79.68 | 72.06 | 10.2 | 1.08 | | 37.96 | | 37.96 | |
| AspaTax | 2.42 | 6.81 | 4.46 | 0.43 | | 16.6 | | 54.57 | |
| Cldph | 3.03 | 4.9 | 3.74 | 0.48 | | 13.93 | | 68.49 | |
| Jania | 3.28 | 5.39 | 2.75 | 1.02 | | 10.25 | | 78.75 | |
| Padina | 2.71 | 2.79 | 2.47 | 0.58 | | 9.2 | | 87.94 | |
| Ellis | 1.49 | 2.19 | 1.64 | 0.65 | | 6.09 | | 94.03 | |
| Cod | 1.9 | 0.27 | 1.07 | 0.4 | | 3.99 | | 98.02 | |

S10. Estimated regression parameters, 95% confidence interval, and *p*-values for the percent cover GLM of major algae taxa. The response was the taxa percent cover and predictors were treatment and months. Plot id was used as random effects (to account for the repeated measure nature of the design). Negative values in the estimated parameter indicate a decline in treated plots compared to the control. Significant parameters are in bold. Superscript numerals represent cases where the model assumptions were violated: †- Kolmogorov-Smirnov normality test, ‡- homoscedasticity.A picture containing scatter chart

Description automatically generated

##### S11. Estimated regression parameters, 95% CI and *p*-values for invertebrate percent cover, richness, Shannon- Wiener diversity (H’), number of individual and multivariate dispersion index (MVDISP) extracted from GLM’s. Negative values in the estimate parameter indicate a decline in treated plots compared to the control. Significant parameters are in bold. **†**- indicate that the dispersion assumption was violated.A picture containing graphical user interface Description automatically generated

Scatter chart

Description automatically generated with medium confidence

S12. nMDS ordinations of the invertebrates’ community in three different surveys. A. Colors represent the treatments: control (yellow), poisoning (blue), and removal (red). Black symbols represent the centroids of each survey. B. Colors represent the months that each survey was conducted. Data was log transformed and the similarity matrix was calculated using Bray Curtis index. k=2.