**Supplementary Material**

**Supplementary Table 1.** Sampling sites coordinates and depth range. The fieldwork was conducted between January and March of 2016.

|  |  |  |  |
| --- | --- | --- | --- |
| Reef site | Latitude | Longitude | Depth range (meters) |
| Inema | 12°48'52.20"S | 38°29'46.59"W | 2-4 |
| Pedra Cardinal | 12°50'15.10"S | 38°32'58.28"W | 7-13 |
| Poste 1 | 12°49'21.71"S | 38°33'36.66"W | 5-7 |
| Frades Sul | 12°48'34.62"S | 38°37'36.19"W | 3-4 |
| Pedra Alva | 12°52'22.02"S | 38°31'46.99"W | 8-13 |
| Poste 5 | 12°47'51.39"S | 38°34'17.16"W | 4-6 |
| Mangueira | 12°50'44.38"S | 38°30'48.24"W | 7-11 |
| Poste 4 | 12°48'52.98"S | 38°34'17.98"W | 7-12 |
| Poste 6 | 12°47'57.58"S | 38°35'1.08"W | 6-13 |
| Ilha de Maré | 12°47'6.90"S | 38°32'56.18"W | 2-3 |

**Supplementary Table 2.** Mean percentage cover of the different taxa sampled by photo-quadrats in ten reef sites in Todos os Santos Bay (MA, Mangueira; IM, Ilha de Maré; P1, Poste 1; CA, Cardinal; IN, Inema; P4, Poste 4; P5, Poste 5; P6, Poste 6; PA, Pedra Alva; FS, Frades Sul).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | MA | IM | P1 | CA | IN | P4 | P5 | P6 | PA | FS |
| TAXA |  |  |  |  |  |  |  |  |  |  |
| CORAL |  |  |  |  |  |  |  |  |  |  |
| *Agaricia agaricites* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| *Montastraea cavernosa* | 4.5 | 1.3 | 9.9 | 12.4 | 0.5 | 19.0 | 7.3 | 7.1 | 9.0 | 16.7 |
| *Mussismilia hispida* | 1.1 | 0.0 | 0.3 | 0.3 | 0.4 | 0.9 | 0.0 | 0.1 | 0.4 | 0.2 |
| *Porites astreoides* | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| *Scolymia wellsi* | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 | 0.1 | 0.2 | 0.0 | 0.0 |
| *Siderastraea* spp. | 4.1 | 0.8 | 0.5 | 2.6 | 0.6 | 2.2 | 1.5 | 0.7 | 1.1 | 2.1 |
| FIRE CORAL |  |  |  |  |  |  |  |  |  |  |
| *Millepora alcicornis* | 0.0 | 1.5 | 0.8 | 0.4 | 0.3 | 0.0 | 1.2 | 0.5 | 0.0 | 0.9 |
| BLACK CORAL |  |  |  |  |  |  |  |  |  |  |
| *Antipathes* sp.  | 0.0 | 5.2 | 0.1 | 0.2 | 0.2 | 1.5 | 0.4 | 1.6 | 7.2 | 0.0 |
| ZOANTHID |  |  |  |  |  |  |  |  |  |  |
| *Palythoa caribaeorum* | 0.0 | 3.0 | 1.5 | 0.1 | 0.0 | 0.0 | 10.7 | 0.0 | 0.0 | 0.0 |
| *Palythoa* cf. *variabilis* | 0.0 | 0.0 | 48.0 | 13.1 | 47.5 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 |
| *Palythoa* sp. | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| *Zoanthus* sp. | 0.0 | 0.2 | 0.0 | 0.0 | 2.1 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 |
| OCTOCORAL |  |  |  |  |  |  |  |  |  |  |
| *Carijoa riisei* | 1.6 | 0.2 | 0.6 | 0.3 | 0.1 | 7.5 | 2.4 | 23.4 | 0.1 | 0.0 |
| *Lophogorgia punicea* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Muricea sulphurea* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 |
| *Neospongodes atlântica* | 7.2 | 0.5 | 0.0 | 1.4 | 4.8 | 0.3 | 23.4 | 0.0 | 0.0 | 1.1 |
| Other Octocoral | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Phyllogorgia dilatata* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 |
| SEA URCHINS |  |  |  |  |  |  |  |  |  |  |
| *Lytechinus variegatus* | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| SPONGES |  |  |  |  |  |  |  |  |  |  |
| *Aiolochroia crassa* | 0.0 | 0.1 | 0.0 | 0.0 | 0.5 | 0.0 | 0.2 | 0.2 | 0.2 | 0.6 |
| *Amphimedon viridis* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 |
| *Aplisilla rosea* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Aplysina cauliformis* | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.8 |
| *Aplysina fistularis* | 0.0 | 1.4 | 0.1 | 0.6 | 1.2 | 0.7 | 0.9 | 0.0 | 1.0 | 0.5 |
| *Aplysina fulva* | 0.1 | 0.5 | 0.0 | 0.0 | 0.5 | 0.1 | 0.2 | 0.1 | 0.2 | 0.2 |
| *Aplysina insularis* | 0.0 | 0.3 | 0.1 | 0.1 | 0.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Callyspongia* sp. | 0.2 | 0.2 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 |
| *Callyspongia vaginalis* | 0.0 | 0.1 | 0.3 | 0.2 | 0.6 | 0.3 | 0.4 | 0.0 | 0.1 | 0.5 |
| *Cinachirela alloclada* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 |
| *Cinachirela* sp. | 0.0 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.2 | 0.0 | 0.5 | 0.0 |
| *Clathria venosa* | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | 1.6 |
| *Cliona celata* | 0.0 | 0.1 | 1.6 | 0.7 | 0.3 | 1.0 | 0.7 | 0.0 | 1.2 | 0.0 |
| *Cliona delitrix* | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.5 |
| *Cliona varians* | 0.6 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 | 0.1 | 0.2 | 0.0 | 0.9 |
| *Desmapsamma anchorata* | 1.8 | 0.1 | 1.8 | 0.7 | 0.0 | 1.5 | 0.4 | 4.7 | 2.1 | 0.5 |
| *Dragmacidon reticulatum* | 0.0 | 8.7 | 1.6 | 2.4 | 3.4 | 3.8 | 6.2 | 0.0 | 4.3 | 0.0 |
| *Dysidea etheria* | 0.4 | 0.2 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 | 0.4 |
| *Dysidea jania* | 0.3 | 0.7 | 0.2 | 0.2 | 0.4 | 0.3 | 0.6 | 0.0 | 0.4 | 0.2 |
| *Erylus formosus* | 0.0 | 0.1 | 0.0 | 0.1 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| *Ircinia felix* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Ircinia strobilina* | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| *Monanchora arbuscula* | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 |
| *Mycale angulosa* | 0.1 | 0.2 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 |
| *Mycale laxissima* | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.1 | 0.0 | 0.0 |
| *Niphates erecta* | 0.4 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.3 | 0.0 | 1.1 |
| *Scopalina ruetzleri* | 0.9 | 0.0 | 0.1 | 0.0 | 0.0 | 0.3 | 0.3 | 0.7 | 0.1 | 0.1 |
| *Topsentia ophiraphidites* | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.5 | 0.1 | 0.0 | 0.0 | 0.1 |
| OTHER ORGANISM |  |  |  |  |  |  |  |  |  |  |
| *Alicia mirabilis* | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Ascidians | 0.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.2 |
| Colonial Ascidians | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Condylactis gigantean* | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 |
| ALGAE |  |  |  |  |  |  |  |  |  |  |
| Algal Frondose | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 | 0.6 |
| Cyanobacteria | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 0.0 | 9.1 |
| Mixed Cyanobacteria and Turf | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Turf | 51.8 | 2.4 | 0.0 | 0.6 | 0.1 | 0.2 | 0.4 | 47.6 | 0.6 | 37.2 |
| Crustose Coralline Algae | 1.9 | 2.8 | 5.1 | 8.5 | 3.5 | 6.3 | 5.9 | 0.1 | 4.7 | 6.1 |
| Articulated Corallinaceae | 0.0 | 32.2 | 17.9 | 37.1 | 13.6 | 36.1 | 19.3 | 0.0 | 39.0 | 0.2 |
| *Halimeda* spp. | 0.0 | 1.1 | 0.2 | 0.8 | 0.2 | 0.2 | 0.8 | 0.0 | 1.2 | 13.4 |
| INVASIVE SPECIES |  |  |  |  |  |  |  |  |  |  |
| *Tubastraea coccinea* | 0.0 | 0.4 | 0.1 | 0.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |

**Supplementary Table 3.** Summary ofPERMANOVA test of sponge and fish assemblages between reef sites (n=10) based on Bray-Curtis dissimilarity with α = 0.05.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | DF | MS | Pseudo-F | Unique perms | P(perm) |
| **Sponges** Reef site | 9 | 10573 | 3.6996 | 9849 | 0.0001 |
| Res | 985 | 2857.8 |  |  |  |
| Total | 994 |  |  |  |  |
| **Angelfish** |  |  |  |  |  |
| Reef site | 9 | 2577.7 | 2.4481 | 9901 | 0.0007 |
| Res | 90 | 1052.9 |  |  |  |
| Total | 99 |  |  |  |  |

**Supplementary Table 4.** Par-wise testing for differences among reefs with sponge assemblages, based on Bray-Curtis dissimilarity with α = 0.05

|  |  |
| --- | --- |
| Reefs | P(perm) |
| Mangueira |  = | Poste 1 | 0.0893 |
| Mangueira |  = | Cardinal | 0.5429 |
| Mangueira |  = | Inema | 0.0883 |
| Mangueira |  = | Poste6 | 0.0554 |
| Mangueira |  = | Pedra Alva | 0.108 |
| Mangueira | ≠ | I. Maré | 0.0001 |
| Mangueira | ≠ | Poste 4 | 0.0248 |
| Mangueira | ≠ | Poste 5 | 0.0001 |
| Mangueira | ≠ | Frades | 0.0343 |
| Ilha de Maré |  = | Poste 5 | 0.4872 |
| Ilha de Maré | ≠ | Poste 1 | 0.0001 |
| Ilha de Maré | ≠ | Cardinal | 0.0001 |
| Ilha de Maré | ≠ | Inema | 0.0179 |
| Ilha de Maré | ≠ | Poste 4 | 0.0045 |
| Ilha de Maré | ≠ | Poste 6 | 0.0134 |
| Ilha de Maré | ≠ | Pedra Alva | 0.0022 |
| Ilha de Maré | ≠ | Frades | 0.0001 |
| Poste 1 |  = | Cardinal | 0.2812 |
| Poste 1 | ≠ | Inema | 0.0019 |
| Poste 1 | ≠ | Poste 4 | 0.0015 |
| Poste 1 | ≠ | Poste 5 | 0.0001 |
| Poste 1 | ≠ | Poste 6 | 0.0048 |
| Poste 1 | ≠ | Pedra Alva | 0.0475 |
| Poste 1 | ≠ | Frades | 0.0084 |
| Cardinal |  = | Inema | 0.0558 |
| Cardinal |  = | Pedra Alva | 0.106 |
| Cardinal | ≠ | Poste 4 | 0.021 |
| Cardinal | ≠ | Poste 5 | 0.0001 |
| Cardinal | ≠ | Poste 6 | 0.0449 |
| Cardinal | ≠ | Frades | 0.0297 |
| Inema |  = | Poste 6 | 0.1559 |
| Inema | ≠ | Poste 4 | 0.0181 |
| Inema | ≠ | Poste 5 | 0.0019 |
| Inema | ≠ | Pedra Alva | 0.0385 |
| Inema | ≠ | Frades | 0.0011 |
| Poste 4 |  = | Poste 6 | 0.0856 |
| Poste 4 |  = | Pedra Alva | 0.1441 |
| Poste 4 | ≠ | Poste 5 | 0.0067 |
| Poste 4 | ≠ | Frades | 0.0099 |
| Poste 5 | ≠ | Poste 6 | 0.0096 |
| Poste 5 | ≠ | Pedra Alva | 0.0014 |
| Poste 5 | ≠ | Frades | 0.0001 |
| Poste 6 |  = | Pedra Alva | 0.0588 |
| Poste 6 | ≠ | Frades | 0.0003 |
| Pedra Alva | ≠ | Frades | 0.0136 |

**Supplementary Table 5.** Par-wise testing for differences among reefs with angelfish assemblages, based on Bray-Curtis dissimilarity with α = 0.05

|  |  |
| --- | --- |
| Reefs | P(perm) |
| Mangueira | ≠ | Ilha de Maré | 0.0199 |
| Mangueira | ≠ | Inema | 0.0195 |
| Mangueira | ≠ | Poste 5 | 0.0051 |
| Mangueira | = | Frades Sul | 0.6131 |
| Mangueira | = | Poste 1 | 0.5357 |
| Mangueira | = | Cardinal | 0.1047 |
| Mangueira | = | Poste 4 | 0.0511 |
| Mangueira | = | Poste 6 | 0.5235 |
| Mangueira | = | Pedra alva | 0.8959 |
| Ilha de Maré | = | Poste 1 | 0.0545 |
| Ilha de Maré | ≠ | Cardinal | 0.0385 |
| Ilha de Maré | ≠ | Poste 4 | 0.0272 |
| Ilha de Maré |  | Inema | - |
| Ilha de Maré | = | Poste 5 | 0.8928 |
| Ilha de Maré | = | Poste 6 | 0.2622 |
| Ilha de Maré | ≠ | Pedra Alva | 0.0056 |
| Ilha de Maré | = | Frades Sul | 0.236 |
| Poste 1 | = | Cardinal | 0.5036 |
| Poste 1 | ≠ | Inema | 0.0258 |
| Poste 1 | ≠ | Poste 4 | 0.0126 |
| Poste 1 | ≠ | Poste 5 | 0.0129 |
| Poste 1 | = | Poste 6 | 0.2518 |
| Poste 1 | = | Pedra Alva | 0.3224 |
| Poste 1 | = | Frades Sul | 0.2846 |
| Cardinal | ≠ | Inema | 0.0271 |
| Cardinal | ≠ | Poste 4 | 0.0016 |
| Cardinal | ≠ | Poste 5 | 0.0098 |
| Cardinal | = | Poste 6 | 0.0673 |
| Cardinal | = | Pedra Alva | 0.1139 |
| Cardinal | = | Frades Sul | 0.0793 |
| Inema | = | Poste 4 | 0.0725 |
| Inema |  | Poste 5 | - |
| Inema | = | Poste 6 | 0.241 |
| Inema | ≠ | Pedra Alva | 0.0051 |
| Inema | = | Frades sul | 0.2721 |
| Poste 4 | ≠ | Poste 5 | 0.0494 |
| Poste 4 | = | Poste 6 | 0.4301 |
| Poste 4 | ≠ | Pedra Alva | 0.0048 |
| Poste 4 | = | Frades sul | 0.1723 |
| Poste 5 | = | Poste 6 | 0.312 |
| Poste 5 | ≠ | Pedra Alva | 0.0004 |
| Poste 5 | = | Frades sul | 0.0908 |
| Poste 6 | = | Pedra Alva | 0.1868 |
| Poste 6 | = | Frades sul | 0.8183 |
| Pedra Alva | = | Frades sul | 0.3943 |
|  |  |  |  |

**Supplementary Table 6.** Number of interactions among sponge species and hermatypic coral species.

|  |  |
| --- | --- |
| Sponge species | Hermatypic coral species |
|  | *Montastraea cavernosa* | *Siderastraea* spp. | *Mussismillia hispida* | *Millepora alcicornis* | *Agaricia agaricites* | *Scolymia wellsi* |
| *Aplysina fistularis* | 2 | 0 | 0 | 0 | 0 | 0 |
| *Aplysina fulva* | 0 | 1 | 1 | 0 | 0 | 0 |
| *Aplysina cauliformis* | 12 | 4 | 0 | 0 | 0 | 0 |
| *Aiolochroia crassa* | 1 | 0 | 0 | 0 | 0 | 0 |
| *Clathria venosa* | 9 | 4 | 0 | 0 | 0 | 0 |
| *Callyspongia* spp. | 1 | 1 | 2 | 5 | 0 | 0 |
| *Cliona delitrix* | 0 | 4 | 0 | 0 | 0 | 0 |
| *Dysidea etheria* | 5 | 2 | 0 | 0 | 0 | 0 |
| *Dysidea janiae* | 1 | 0 | 0 | 0 | 0 | 0 |
| *Desmapsamma anchorata* | 18 | 6 | 0 | 8 | 0 | 0 |
| *Darwinella* sp. | 0 | 1 | 0 | 0 | 0 | 0 |
| *Ircinia strobilina* | 0 | 0 | 0 | 1 | 0 | 0 |
| *Mycale laxissima* | 0 | 4 | 0 | 1 | 0 | 0 |
| *Monanchora arbuscula* | 2 | 0 | 0 | 0 | 1 | 0 |
| *Niphates erecta* | 2 | 1 | 0 | 0 | 0 | 0 |
| *Neopetrosia* sp*.* | 8 | 2 | 0 | 0 | 0 | 1 |
| *Scopalina ruetzleri* | 6 | 2 | 0 | 0 | 0 | 0 |