Supplementary material

Are we talking about coral or macroalgae reefs? Status of coral reef communities on the Caribbean Coast of Costa Rica

Fabio Quezada-Perez 1, Sebastián Mena 1, Cindy Fernández-García 1 2 3, and Juan José Alvarado 1 2 3 \*

1. Escuela de Biología, Universidad de Costa Rica, San Pedro 11801, San José, Costa Rica; fabio.29.qp@gmail.com; sebas.menago@gmail.com; cindy.fernandezgarcia@ucr.ac.cr; juan.alvarado@ucr.ac.cr
2. Centro de Investigación en Ciencias del Mar y Limnología, Universidad de Costa Rica, San Pedro 11801, San José, Costa Rica.
3. Centro de Investigación en Biodiversidad y Ecología Tropical, Universidad de Costa Rica, San Pedro 11801, San José, Costa Rica.

**\*** Correspondence: juan.alvarado@ucr.ac.cr

**Tables**

**Table S1.** Survey site coordinates and mean depth.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Region | Locality | Site Code | Lat | Long | Mean Depth (m) |
| Puerto Viejo  -  Punta Mona | Piedras Blancas | pb2 | 9.64092 | -82.6369 | 6.1 |
| Manzanillo | ma1 | 9.65572 | -82.65828 | 7 |
| Punta Uva | lp3 | 9.64697 | -82.6837 | 4.1 |
| ar4 | 9.64629 | -82.68957 | 7 |
| ar14 | 9.644055 | -82.688451 | 4.5 |
|  | se13 | 9.64212 | -82.69675 | 4.8 |
| Punta Cocles | lc10 | 9.64809 | -82.72018 | 6 |
| Río Cocles | rc9 | 9.65136 | -82.72993 | 5.3 |
| Puerto Viejo | pv7 | 9.66142 | -82.7550 | 7 |
| sb8 | 9.66149 | -82.74612 | 7.4 |
| Cahuita | Puerto Vargas | pv15 | 9.737956 | -82.80584 | 2.6 |
| bi16 | 9.737457 | -82.807739 | 2.5 |
| Punta Cahuita  -  Perezoso | po19 | 9.747712 | -82.818756 | 2 |
| le18 | 9.737457 | -82.807739 | 2.5 |
| pe17 | 9.737956 | -82.80584 | 2.5 |
| Moín  -  Limón | Isla Uvita | uv20 | 9.99103 | -83.00998 | 6.7 |
| uv21 | 9.99138 | -83.01193 | 3.9 |
| uv22 | 9.99432 | -83.00917 | 5.6 |
| uv23 | 9.99566 | -83.01221 | 8.4 |
| uv28 | 9.992923 | -83.012862 | 3.5 |
| Isla Pájaros | pa24 | 10.017052 | -83.075592 | 4.1 |
| pa25 | 10.017063 | -83.075981 | 4.1 |
| pa26 | 10.017225 | -83.076276 | 4.1 |
| Pájaro Loco | pl27 | 10.010772 | -83.05102 | 2.1 |
|  |  |  |  |  |  |

**Table S2.** Coral species registered in the survey sites of the Caribbean coast of Costa Rica

|  |  |
| --- | --- |
| **Family** | **Specie** |
| Acroporidae | *Acropora palmata* |
| Agariciidae | *Agaricia agaricites* |
|  | *Agaricia humilis* |
| Faviidae | *Favia fragum* |
|  | *Mycetophyllia lamarckiana* |
|  | *Pseudodiploria clivosa* |
|  | *Pseudodiploria strigosa* |
| Poritidae | *Porites astreoides* |
|  | *Porites porites* |
| Montastraeidae | *Montastraea cavernosa* |
| Merulinidae | *Orbicella franksi* |
| Rhizangiidae | *Siderastrea radians* |
|  | *Siderastrea siderea* |
| Milleporidae | *Millepora complanata* |
| Acroporidae | *Acropora palmata* |
| Agariciidae | *Agaricia agaricites* |
| Agariciidae | *Agaricia agaricites* |

**Table S3.** Similarity Percentages (SIMPER) analysis showing the benthic taxa that contributed the most to the overall dissimilarity between regions.

|  |  |  |  |
| --- | --- | --- | --- |
| **Regions** | **Taxa** | **Average ± SD**  **contribution** | **% Cumulative**  **contribution** |
| Moín – Limón  ~  Cahuita | Turf algae | 0.081 | 17 |
| *Dictyota / Dictyopteris* | 0.065 | 31 |
| *Agaricia agaricites* | 0.057 | 43 |
| Moín – Limón  ~  Puerto Viejo – Punta Mona | *Dictyota / Dictyopteris* | 0.183 | 31 |
| Turf algae | 0.129 | 53 |
| *Acropora palmata* | 0.036 | 59 |
| Cahuita  ~  Puerto Viejo – Punta Mona | *Dictyota / Dictyopteris* | 0.196 | 32 |
| Turf algae | 0.143 | 55 |
| *Agaricia agaricites* | 0.056 | 64 |
|  |  |  |  |

**Table S4.** Density, biomass, and fishery value of fish species registered in the survey sites of the Caribbean coast of Costa Rica. Fishery value was based on [1].

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Order** | **Family** | **Specie** | **Mean Density**  **± SD**  **(ind / 100 m2)** | **Mean Biomass**  **± SD**  **(g / 100 m2)** | **Fishery Value**  **(USD / kg)** |
| Acanthuriformes | Acanthuridae |  | 8.53 ± 30 | 1381.67 ± 5205.87 |  |
| Acanthurus chirurgus | 0.17 ± 0.37 | 10.27 ± 28.29 | 0 |
| Acanthurus coeruleus | 7.79 ± 29.38 | 1354.60 ± 5207.38 | 0 |
| Acanthurus tractus | 0.58 ± 1.17 | 16.87 ± 34.34 | 0 |
| Chaetodontidae |  | 0.38 ± 0.65 | 18.00 ± 38.06 |  |
| Chaetodon capistratus | 0.04 ± 0.17 | 0.53 ± 2.07 | 0 |
| Chaetodon ocellatus | 0.14 ± 0.37 | 6.67 ± 16.50 | 0 |
| Chaetodon striatus | 0.20 ± 0.39 | 10.80 ± 29.64 | 0 |
| Pomacanthidae | Holacanthus ciliaris | 0.04 ± 0.17 | 5.47 ± 21.17 | 0 |
| Acropomatiformes | Pempheridae | Pempheris schomburgkii | 0.27 ± 1.03 | 3.53 ± 13.68 | 0 |
| Blenniiformes | Blenniidae | Ophioblennius macclurei | 0.27 ± 0.61 | 1.17 ± 6.65 | 0 |
| Labrisomidae | Labrisomus sp. | 0.09 ± 0.34 | 1.07 ± 4.13 | 0 |
| Carangiformes | Carangidae |  | 0.22 ± 0.53 | 20.40 ± 49.11 |  |
| Caranx bartholomaei | 0.06 ± 0.26 | 7.33 ± 21.06 | 4.38\* |
| Caranx ruber | 0.13 ± 0.52 | 12.07 ± 46.73 | 4.38 |
| Elagatis bipinnulata | 0.02 ± 0.07 | 1.00 ± 3.87 | 4.41\* |
| Centrarchiformes | Cirrhitidae | Amblycirrhitus pinos | 0.006 ± 0.022 | 0.07 ± 0.26 | 0 |
| Kyphosidae | Kyphosus sectatrix | 3.91 ± 11.00 | 526.67 ± 1411.43 | 2.20\* |
| Eupercaria incertae sedis | Haemulidae |  | 2.30 ± 3.45 | 293.87 ± 497.97 |  |
| Anisotremus virginicus | 0.64 ± 1.71 | 93.00 ± 254.83 | 4.27 |
| Anisotremus sp. | 0.40 ± 1.55 | 41.33 ± 160.08 | 4.27 |
| Haemulon aurolineatum | 0.86 ± 2.76 | 127.60 ± 448.36 | 4.28 |
| Haemulon carbonarium | 0.13 ± 0.37 | 10.33 ± 27.38 | 4.28 |
| Haemulon macrostomum | 0.22 ± 0.59 | 19.40 ± 69.28 | 4.28 |
| Haemulon sciurus | 0.04 ± 0.17 | 2.20 ± 8.52 | 4.28 |
| Labridae |  | 38.75 ± 27.60 | 188.40 ± 143.98 |  |
| Bodianus rufus | 0.006 ± 0.022 | 0.27 ± 1.03 | 0 |
| Halichoeres bivittatus | 5.42 ± 6.58 | 38.27 ± 65.67 | 0 |
| Halichoeres garnoti | 0.01 ± 0.04 | 2.20 ± 8.52 | 0 |
| Halichoeres maculipinna | 0.81 ± 1.57 | 9.33 ± 15.29 | 0 |
| Halichoeres pictus | 0.04 ± 0.17 | 0.47 ± 1.80 | 0 |
| Halichoeres radiatus | 0.11 ± 0.34 | 3.86 ± 14.17 | 0 |
| Thalassoma bifasciatum | 32.36 ± 26.18 | 136.33 ± 89.89 | 0 |
| Lutjanidae |  | 1.91 ± 3.83 | 272.86 ± 903.13 |  |
| Lutjanus apodus | 1.29 ± 3.39 | 267.80 ± 904.64 | 5.52 |
| Lutjanus synagris | 0.62 ± 2.21 | 2.00 ± 7.74 | 5.44 |
| Ocyurus chrysurus | 0.006 ± 0.022 | 3.06 ± 11.87 | 5.31 |
| Scaridae |  | 3.27 ± 5.92 | 267.80 ± 488.70 |  |
| Cryptotomus roseus | 0.006 ± 0.022 | 0.000 ± 0.000 | 0 |
| Nicholsina usta | 0.29 ± 0.80 | 1.47 ± 4.03 | 0 |
| Sparisoma rubripinne | 0.98 ± 1.47 | 96.7 ± 204.09 | 4.14 |
| Sparisoma viride | 2.00 ± 5.47 | 169.67 ± 407.51 | 4.14 |
| Sciaenidae | Sciaenidae sp. | 0.01 ± 0.04 | 0.40 ± 1.54 | 5.51\* |
| Holocentriformes | Holocentridae |  | 1.83 ± 6.51 | 88.40 ± 302.65 |  |
| Holocentrus adscensionis | 0.077 ± 0.30 | 7.73 ± 29.95 | 2.20 |
| Holocentrus rufus | 0.006 ± 0.02 | 0.07 ± 0.26 | 2.20 |
| Sargocentron vexillarium | 1.75 ± 6.52 | 80.60 ± 303.40 | 0 |
| Mulliformes | Mullidae | Pseudupeneus maculatus | 0.04 ± 0.15 | 1.80 ± 6.98 | 0 |
| Ovalentaria incertae sedis | Pomacentridae |  | 45.65 ± 27.43 | 686.13 ± 967.85 |  |
| Abudefduf saxatilis | 8.31 ± 16.11 | 273.87 ± 898.48 | 0 |
| Microspathodon chrysurus | 3.20 ± 4.73 | 162.80 ± 320.46 | 0 |
| Stegastes adustus | 30.17 ± 25.53 | 223.93 ± 197.44 | 0 |
| Stegastes diencaeus | 3.38 ± 8.97 | 23.07 ± 61.01 | 0 |
| Stegastes leucostictus | 0.42 ± 1.62 | 0.93 ± 3.61 | 0 |
| Stegastes partitus | 0.15 ± 0.46 | 0.67 ± 1.80 | 0 |
| Stegastes xanthurus | 0.02 ± 0.06 | 1.07 ± 4.13 | 0 |
| Perciformes | Scorpaenidae | Pterois volitans | 0.22 ± 0.41 | 8.20 ± 17.76 | 0 |
| Serranidae |  | 0.28 ± 0.62 | 6.73 ± 14.24 |  |
| Cephalopholis cruentata | 0.04 ± 0.17 | 3.00 ± 11.62 | 6.11 |
| Diplectrum formosum | 0.21 ± 0.56 | 0.27 ± 0.70 | 0 |
| Epinephelus adscensionis | 0.006 ± 0.022 | 1.53 ± 5.98 | 6.11 |
| Rypticus saponaceus | 0.02 ± 0.07 | 1.93 ± 7.49 | 0 |
| Tetraodontiformes | Monacanthidae |  | 0.06 ± 0.17 | 2.73 ± 9.06 |  |
|  | Cantherhines pullus | 0.05 ± 0.17 | 2.67 ± 9.04 | 0 |
|  | Stephanolepis hispida | 0.006 ± 0.022 | 0.07 ± 0.26 | 0 |
| Tetraodontidae |  | 10.25± 16.79 | 36.80 ± 63.68 |  |
|  | Canthigaster jamestyleri | 10.18 ± 16.75 | 36.53 ± 63.52 | 0 |
|  | Canthigaster rostrata | 0.07 ± 0.18 | 7.33 ± 21.06 | 0 |
|  |  |  |  |  |  |

\*Species with fishery commercial value no listed on [1]

References

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