# Appendix A

The *Reef Life Survey* photoquadrat categories are based on the *Collaborative and Automated Tools for Analysis of Marine Imagery* (CATAMI) classification schema (Althaus 2015), which integrates morphological characteristics with high-level taxonomic groupings and includes modifiers related to organismal health status (Edgar *et al.* 2020). Given that this schema is primarily designed for Australian reefs with a significant focus on tropical reef health, some categories were too region-specific for global application. Therefore, we have consolidated several categories, as detailed in Table A.1, to create a more universally applicable classification system suitable on a global scale.

Table 1: Correspondence of the functional groups of substrates and the habitat groups used in this study.

| Photoquadrat Original Categories | Final Classification |
| --- | --- |
| Ahermatypic corals | Sessile invertebrates |
| Ascidians | Sessile invertebrates |
| Ascidians (stalked) | Sessile invertebrates |
| Ascidians (unstalked) | Sessile invertebrates |
| Bare Rock | Bare substrate |
| Barnacles | Sessile invertebrates |
| Black & Octocorals | Soft corals and gorgonians |
| Bottlebrush Acropora corals | Branching corals |
| Bottlebrush Acropora corals\_Bleached | Branching corals |
| Branching Acropora | Branching corals |
| Branching Acropora\_Bleached | Branching corals |
| Branching corals | Branching corals |
| Branching corals\_Bleached | Branching corals |
| Branching Pocillopora | Branching corals |
| Branching Pocillopora\_Bleached | Branching corals |
| Bryozoa | Sessile invertebrates |
| Bryozoan (hard) | Sessile invertebrates |
| Bryozoan (soft) | Sessile invertebrates |
| Caulerpa | Green algae |
| Cnidaria | Sessile invertebrates |
| Cobble | Unconsolidated substrate |
| Colonial Anemones, Zoanthids and Corallimorphs | Sessile invertebrates |
| Columnar corals | Massive corals |
| Columnar corals\_Bleached | Massive corals |
| Coral rubble | Unconsolidated substrate |
| Coral rubble with turf/encrusting algae | Turf |
| Corymbose Acropora corals | Branching corals |
| Corymbose Acropora corals\_Bleached | Branching corals |
| Crustose coralline algae | Crustose coralline algae |
| Dead coral | Dead coral |
| Desmarestia and Himantothallus | Canopy forming algae |
| Digitate corals | Massive corals |
| Digitate corals\_Bleached | Massive corals |
| Durvillaea | Canopy forming algae |
| Ecklonia radiata | Canopy forming algae |
| Encrusting corals | Encrusting corals |
| Encrusting corals\_Bleached | Encrusting corals |
| Encrusting leathery algae | Encrusting leathery algae |
| Filamentous algae\_epiphyte | Filamentous algae |
| Filamentous brown algae\_epiphyte | Filamentous algae |
| Filamentous green algae\_epiphyte | Filamentous algae |
| Filamentous red algae\_epiphyte | Filamentous algae |
| Filamentous rock-attached algae | Filamentous algae |
| Foliose/Plate corals | Foliose/Plate corals |
| Foliose/Plate corals\_Bleached | Foliose/Plate corals |
| Geniculate coralline algae | Geniculate coralline algae |
| Green calcified algae (Halimeda) | Green calcified algae (Halimeda) |
| Heliopora coerulea (blue coral) | Calcareous hydrocorals and octocorals |
| Hydrocoral | Calcareous hydrocorals and octocorals |
| Hydrocoral\_Bleached | Calcareous hydrocorals and octocorals |
| Hydroids | Sessile invertebrates |
| Large brown laminarian kelps | Canopy forming algae |
| Large-polyp stony corals (free-living) | Large-polyp stony corals (free-living) |
| Large-polyp stony corals (free-living)\_Bleached | Large-polyp stony corals (free-living) |
| Macroalgae | Canopy forming algae |
| Macroalgae\_canopy forming | Canopy forming algae |
| Macrocystis | Canopy forming algae |
| Massive corals | Massive corals |
| Massive corals\_Bleached | Massive corals |
| Medium foliose brown algae | Brown algae |
| Medium foliose green algae | Green algae |
| Medium foliose red algae | Red algae |
| Molluscs | Sessile invertebrates |
| Organ-pipe coral (Tubipora) | Calcareous hydrocorals and octocorals |
| Other fucoids | Canopy forming algae |
| Pebbles/gravel/shell | Unconsolidated substrate |
| Phyllospora | Canopy forming algae |
| Polychaete | Sessile invertebrates |
| Sand | Unconsolidated substrate |
| Seagrass (Halophila) | Seagrass |
| Seagrass (straplike) | Seagrass |
| Seagrasses | Seagrass |
| Sessile bivalves | Sessile invertebrates |
| Sessile gastropods | Sessile invertebrates |
| Slime (not trapping sediment) | Bare substrate |
| Small <2cm foliose algal cover (not trapping sediment) | Turf |
| Soft corals and gorgonians | Soft corals and gorgonians |
| Solitary Anemones | Sessile invertebrates |
| Sponges | Sessile invertebrates |
| Sponges (encrusting) | Sessile invertebrates |
| Sponges (erect) | Sessile invertebrates |
| Sponges (hollow) | Sessile invertebrates |
| Sponges (massive) | Sessile invertebrates |
| Stony corals | Encrusting corals |
| Stony corals\_Bleached | Encrusting corals |
| Sub-massive corals | Massive corals |
| Sub-massive corals\_Bleached | Massive corals |
| Substrate | Bare substrate |
| Tabular Acropora corals | Foliose/Plate corals |
| Tabular Acropora corals\_Bleached | Foliose/Plate corals |
| Turfing algae (<2 cm high algal/sediment mat on rock) | Turf |
| Worms | Sessile invertebrates |

## References

Althaus, N.A.F., Franziska AND Hill. (2015). A standardised vocabulary for identifying benthic biota and substrata from underwater imagery: The CATAMI classification scheme. *PLOS ONE*, 10, 1–18.

Edgar, G.J., Cooper, A., Baker, S.C., Barker, W., Barrett, N.S., Becerro, M.A., *et al.* (2020). Establishing the ecological basis for conservation of shallow marine life using reef life survey. *Biological Conservation*, 252, 108855.