## List of outputs of ReefMod-GBR (09/09/2021)

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**Matlab file:** **sR0_FORECAST_100REEFS_CCSM4_85.mat**

**Characteristics of simulations:**

- 3 replicate runs
- 100 reefs
- number of time steps: 1 (initial step) + 26 (hindcast) + 58 (forecast) = 85
- 6 coral groups

**Model description:** https://www.biorxiv.org/content/10.1101/2020.12.01.406413v1.abstract

**Notes:**

- time step is 6 month (summer/winter)
- model initialised (t=1) in winter 2007 (valued as 2007.5 for graphical representations)
- final step of hindcast (t=27) is winter 2020 (valued as 2020.5)
- 'nongrazable' represents the proportion of space that cannot be colonised by corals and algae (ie, patch of sand, sponges, …). Important mostly for coral-algal competition (intensifies grazing on algal substrates) but convenient here to limit total coral cover to a realistic maximum (<80%). At initialisation, the cover of nongrazable substrates is generated at random for every reef (normal distribution, mean=30%, sd=6%) and kept constant for the entire run.
- sum of all coral cover + nongrazable + all algae should be ≤100% (the rest is free substrates = EAC)
- coral size frequency is given as the number of coral colonies over a simulated reef grid (400m2) for the following life history stages:
  - juveniles: 4 (diameter classes with bins (cm): 0 1 2 3 4
  - adolescents: 13 diameter classes with bins (cm): 4 5 6 7 8 9 10 11 12 13 14 15 16 17
  - adults: 9 diameter classes with bins (cm): 17 27 37 47 57 67 77 87 97
- rubble cover is not spatially explicit and not accounted in space occupancy (i.e., sum of all coral cover + all algal covers + free space + nongrazable + rubble can be >100%). The reason is that we cannot model every rubble piece. Rubble pieces are moving so they can be everywhere on the 20m×20m surface. Plus, coral larvae can settle on rubble. Thus, rubble is just a variable that reduces survival of coral juveniles following a simple rule: 20% rubble reduces the survival rate of all juveniles by 20% (mean field approximation). This might be re-visited with the RRAP Rubble team.

| Variables | Description | Dimensions |
|---|---|---|
| coral_cover_per_taxa | Percent coral cover (0 – 100%) | 3×100×85×6 |
| coral_cover_lost_COTS | Percent coral cover lost due to COTS (0 – 100%) | 3×100×84×6 |
| coral_cover_lost_cyclones | Percent coral cover lost due to cyclones (0 – 100%) | 3×100×84×6 |
| coral_cover_lost_bleaching | Percent coral cover lost due to bleaching (0 – 100%) | 3×100×84×6 |
| nb_coral_juv | Number of coral juveniles per grid per size class (4) | 3×100×84×6×4 |
| nb_coral_adol | Number of coral adolescents per grid per size class (13) | 3×100×84×6×13 |
| nb_coral_adult | Number of coral adults per grid per size class (9) | 3×100×84×6×9 |
| COTS_mantatow | Number of subadult and adult CoTS per tow | 3×100× 85 |
| rubble | Percent cover of loose coral rubble (0 – 100%) | 3×100× 85 |
| nongrazable | Percent cover of nongrazable, non colonisable substrates (0 – 100%) | 3×100 |
| macroTurf | Percent cover of long, thick turf (0 – 100%) | 3×100× 85 |
| macroEncrustFleshy | Percent cover of encrusting fleshy (carpeting) macroalgae (typically, Lobophora) (0 – 100%) | 3×100× 85 |

| | | |
|---|---|---|
| macroUprightFleshy | Percent cover of upright fleshy macroalgae (0 – 100%) | 3×100× 85 |
| reefs | Table of reef descriptors<br>(HabitatAreaKm2 = area from GBRMPA reef outline)<br>(ShelfPosition = 1: inshore, 2:midshelf, 3: outershelf) | 100×7 |
| years | Indicative years of model time steps | 1× 85 |