

Dataset: Survival and growth of recruit-sized ramets growing inside or outside Sargassum beds (crowded and isolated conditions, respectively) in the MPA and non-MPA of two villages in Fiji

Project(s): Killer Seaweeds: Allelopathy against Fijian Corals (Killer Seaweeds)

Abstract: Survival and growth of recruit-sized ramets of *Sargassum polycystum* growing inside or outside Sargassum beds (crowded and isolated conditions, respectively) in protected and non-protected areas (MPA and non-MPA, respectively) in two villages in Fiji. Growth was obtained using the initial height measurement from each ramet and subtracting it from its final height, meaning the ramets that died were recorded as negative change. An average final height was calculated from two sub-samples (the two MPA and two non-MPA ramets) on each tile after 3 months of experiment. Survival was the average number of days survived by the two MPA ramets and by the two non-MPA ramets in each tile Details in Dell et al. 2016 Plos One. For a complete list of measurements, refer to the supplemental document 'Field_names.pdf', and a full dataset description is included in the supplemental file 'Dataset_description.pdf'. The most current version of this dataset is available at: <http://www.bco-dmo.org/dataset/644080>

Description: Growth and survival of recruit-sized *Sargassum polycystum* ramets in crowded and isolated habitats

Survival and growth of recruit-sized ramets of *Sargassum polycystum* growing inside or outside *Sargassum* beds (crowded and isolated conditions, respectively) in protected and non-protected areas (MPA and non-MPA, respectively) in two villages in Fiji.

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Related Reference:

Dell, C., Longo, G.O., Hay, M.E. (2016) Positive feedbacks enhance macroalgal resilience on Degraded Coral Reefs. Plos One.

Related Datasets:

[Sargassum mature growth - figure 2](#)

[Sargassum recruit-sized survival - figure 3](#)

[Sargassum mature growth conspecific - figure 4](#)

Acquisition

(Reference cited below are from Dell et al (2016) Plos One 1

Description: Study site and species:

This study was conducted between January and May in 2013 and 2015 on the coral coast of Fiji's main island, Viti Levu, in the villages of Votua and Vatu-o-lailai (18° 12' 32S, 177° 42' 00E and 18° 12' 13S, 177° 41' 29E respectively; Fig 1). These villages are ~3km apart and each has jurisdiction over their stretch of reef flat; a habitat ranging between ~1.5 and 3m deep at high tide and between ~0 and 1.5m deep at low tide. In 2002, these villages established small areas (0.8km² in Votua and 0.5 km² in Vatu-o-lailai; Fig 1) as no-take MPAs [25]. Though MPA and non-MPA areas were initially similar in coral and macroalgal cover (33-42% macroalgal cover; 3-12% coral cover [25]), MPAs now differ significantly from the adjacent non-MPAs in benthic cover and fish diversity and abundance. MPAs now have ~56% live coral cover on hard substrate, ~2% macroalgal cover, ~8 fold higher biomass of herbivorous fishes, and higher recruitment of both fishes and corals than the non-MPAs [5,22]. Meanwhile the non-MPAs have lower fish biomass, 5-16% live coral cover on hard substrates and 51-92% macroalgal cover, the majority of which is comprised by Phaeophytes (primarily *Sargassum polycystum* C. Agardh [22]). In the MPAs, macroalgal cover is restricted to the shallowest, most shoreward areas (where access by herbivorous fishes appears limited), whereas macroalgal cover in the non-MPAs extends throughout the habitat. Thus, over distances of only a few hundred metres, there are dramatic differences in community composition that may impact the efficacy of factors controlling macroalgal populations, without the confounding factors of great differences in space or time.

Effect of conspecifics, origin and habitat on survival and growth of recruit-sized ramets

We investigated the effect of conspecifics on the survival and growth of recruit-sized ramets in conjunction with the effect of origin when ramets were not protected from herbivory. Because *Sargassum* beds in the MPAs only exist near shore and we did not want to confound distance from shore with treatment, we conducted this experiment at a depth of ~0.5m (at low tide) between ~10m to 20m from shore in both Votua and Vatu-o-lailai (Fig 1).

As in the previous experiment that also used recruit-sized ramets, small algal recruits (0.5 to 1.5cm tall) were detached from the substrate so that a small piece of reef substrate remained attached to the alga's holdfast and these rock pieces were affixed to tiles using Ecotech coral glue. Two MPA and two non-MPA ramets were attached onto each tile in a square pattern 1cm distance from each other. As before, the ramets were chosen so that the four on each tile were of equal size and the tiles were arranged so there was similar size representation of ramets in each

treatment. In each location, tiles were placed within established Sargassum beds (crowded condition) or placed in open areas (isolated condition) ~2 metres away.

A total of 30 tiles were affixed in the MPA and 30 in the non-MPA within each village, 15 in crowded and 15 in isolated areas. This design ensured there were two origins (MPA or non-MPA) and two density conditions (crowded or isolated) in each of the MPA and non-MPA habitats of both Votua and Vatu-o-lailai.

The tiles were out-planted at the end of February 2013, monitored every 3 days for the first month and then weekly for two subsequent months for mortality and loss. As in the previous tile experiment, if the stone to which the ramet was attached was missing, those individuals were recorded as lost and excluded from subsequent analyses. Of the initial 240 ramets deployed in each village, 16 and 15 individuals were lost (6.7% and 6.2%) from Votua and Vatu-o-lailai, respectively.

Processing At the end of three months, change in height and change in mass were recorded
Description: for each ramet. The initial measurement from each ramet was subtracted from its final, meaning the ramets that died were recorded as negative change. An average final height and average final mass were calculated from the two sub-samples (the two MPA and two non-MPA ramets) on each tile giving an n=15 for each density (isolated/crowded) in each location. These data were analysed by Permutations Analysis of Variance blocked by tile, with origin and density as main effects plus the interaction between the two. This analysis was run separately for each of the four locations using the package Imperm [33] on R version 2.15.3 with $\alpha=0.05$. As significant effects were the same for height as for mass data, only results from the height data are shown.

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- sorted according to database best practices, with slowest changing columns leftmost
- corrected longitude from West to East degrees

Deployment Information

Deployment description for Hay_GaTech Fiji_2013

Studies of corals and seaweed were conducted on reef flats within no-take marine protected areas (MPAs) adjacent to Votua, Vatu-o-lailai, and Namada villages along the Coral Coast of Viti Levu, Fiji in 2013.

Deployment description for Hay_GaTech Fiji_2015

A study of seaweeds was conducted on reef flats within no-take marine protected areas (MPAs) and non-MPAs adjacent to Votua, Vatuo-lailai, and Namada villages along the Coral Coast of Viti Levu, Fiji in 2013.
