

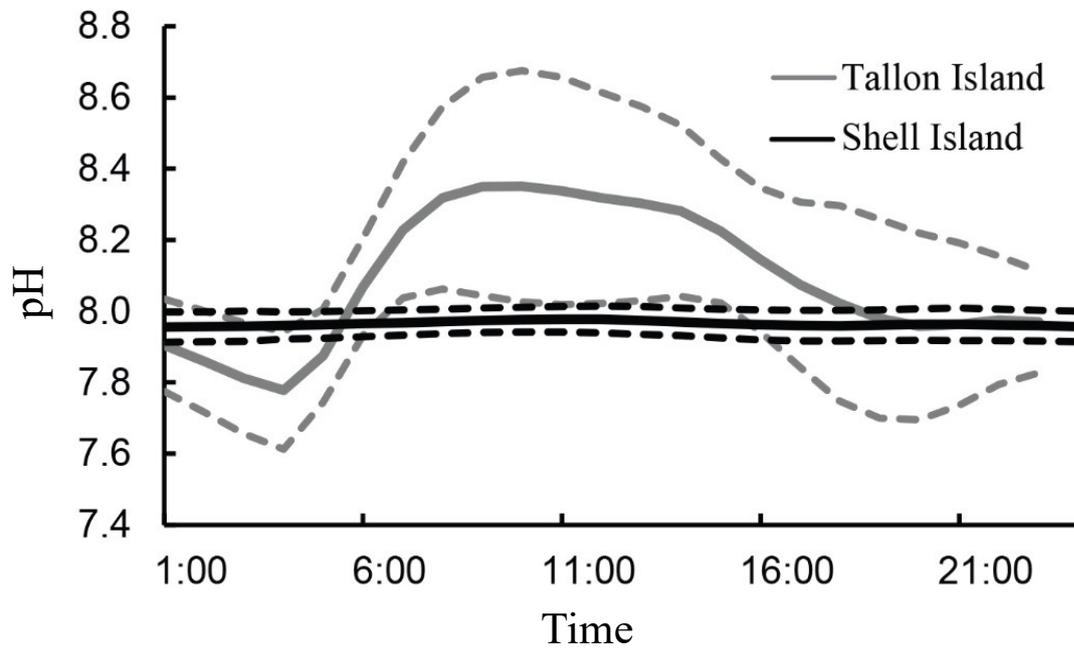
**Supplementary Figures for:**

Moore *et al.*, 2021

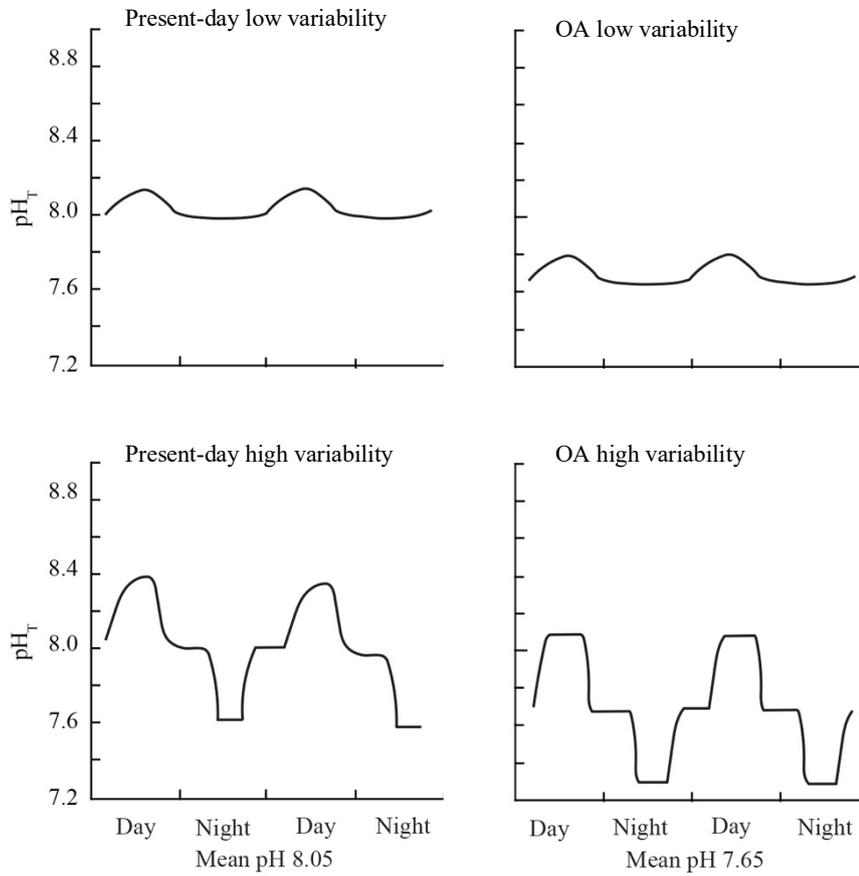
Rapid multi-generational acclimation of coralline algal reproductive structures to ocean acidification



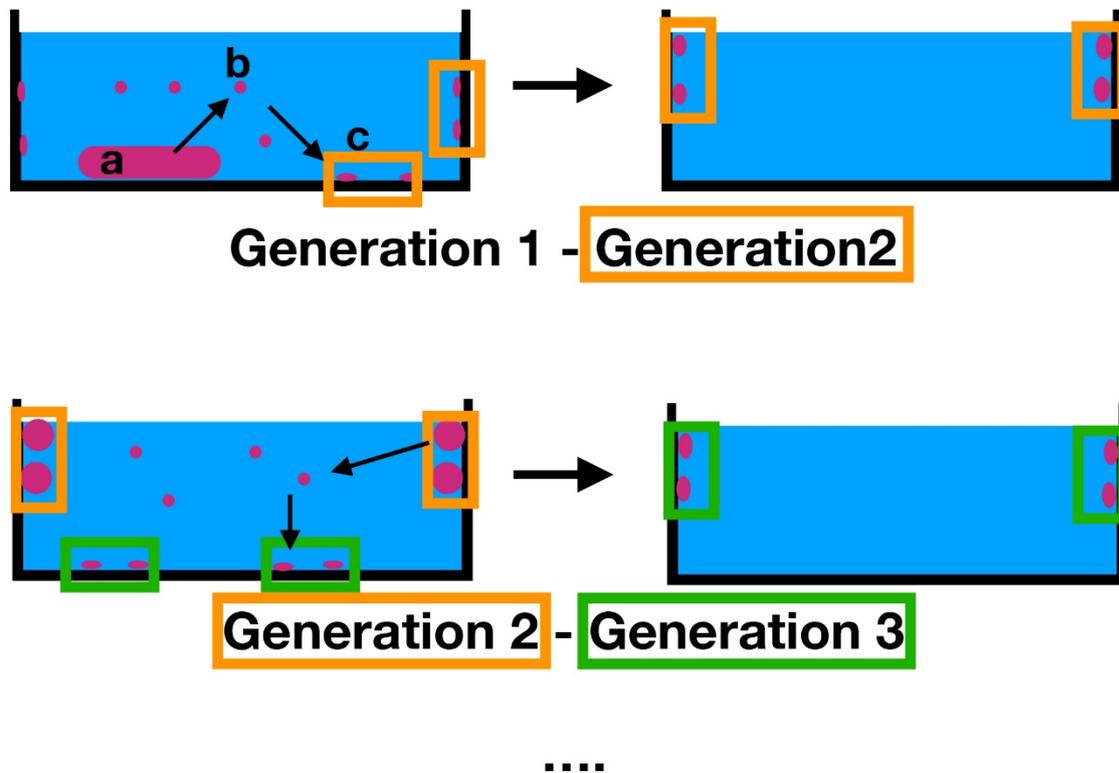
**Figure S1.** Map displaying the location of the two islands from which wild generation one coralline algae were collected. The Tallon island site is characterized by high pH variability, whereas the Shell island site is characterized by low pH variability.



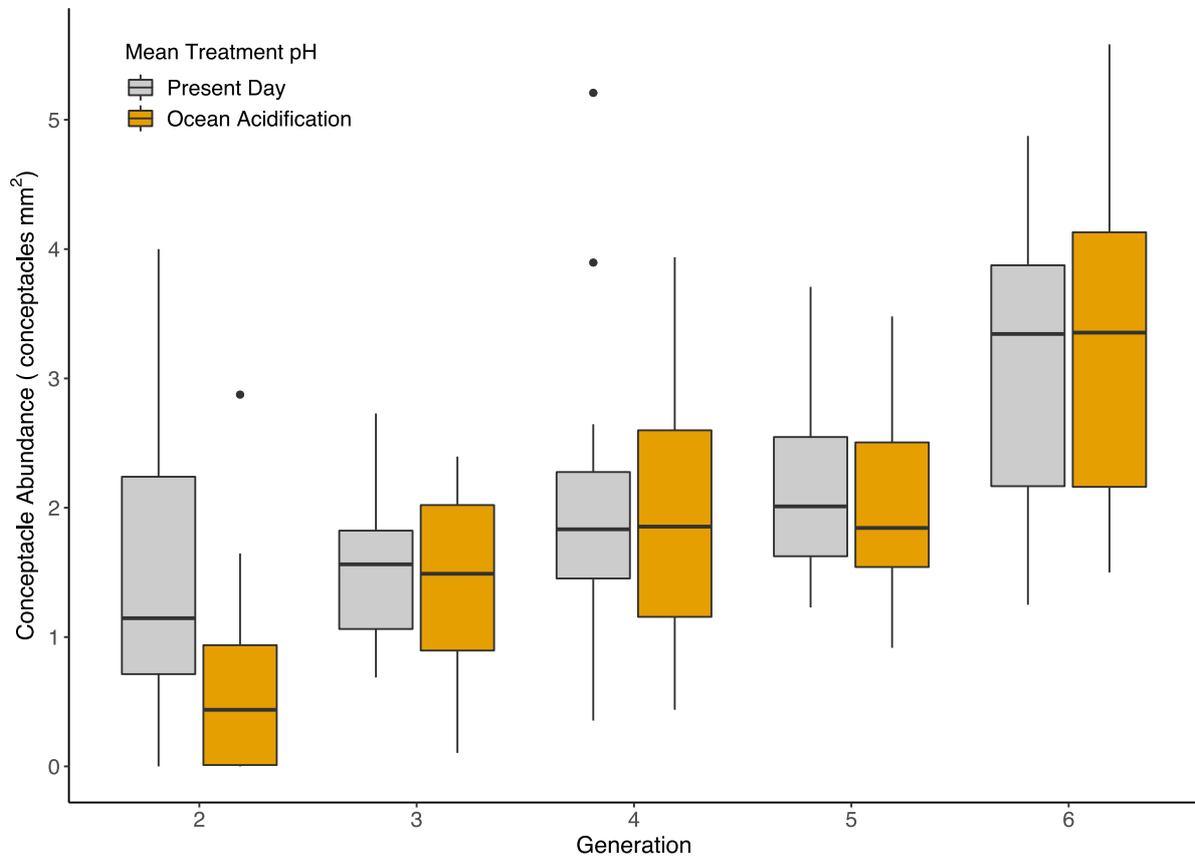
**Figure S2.** Mean seawater pH over 24 hours of the Tallon island (grey) and Shell island (black) collection sites. Measured between April – October 2016. Dashed lines display one standard deviation from the mean. Modified from Cornwall *et al.*, 2018.



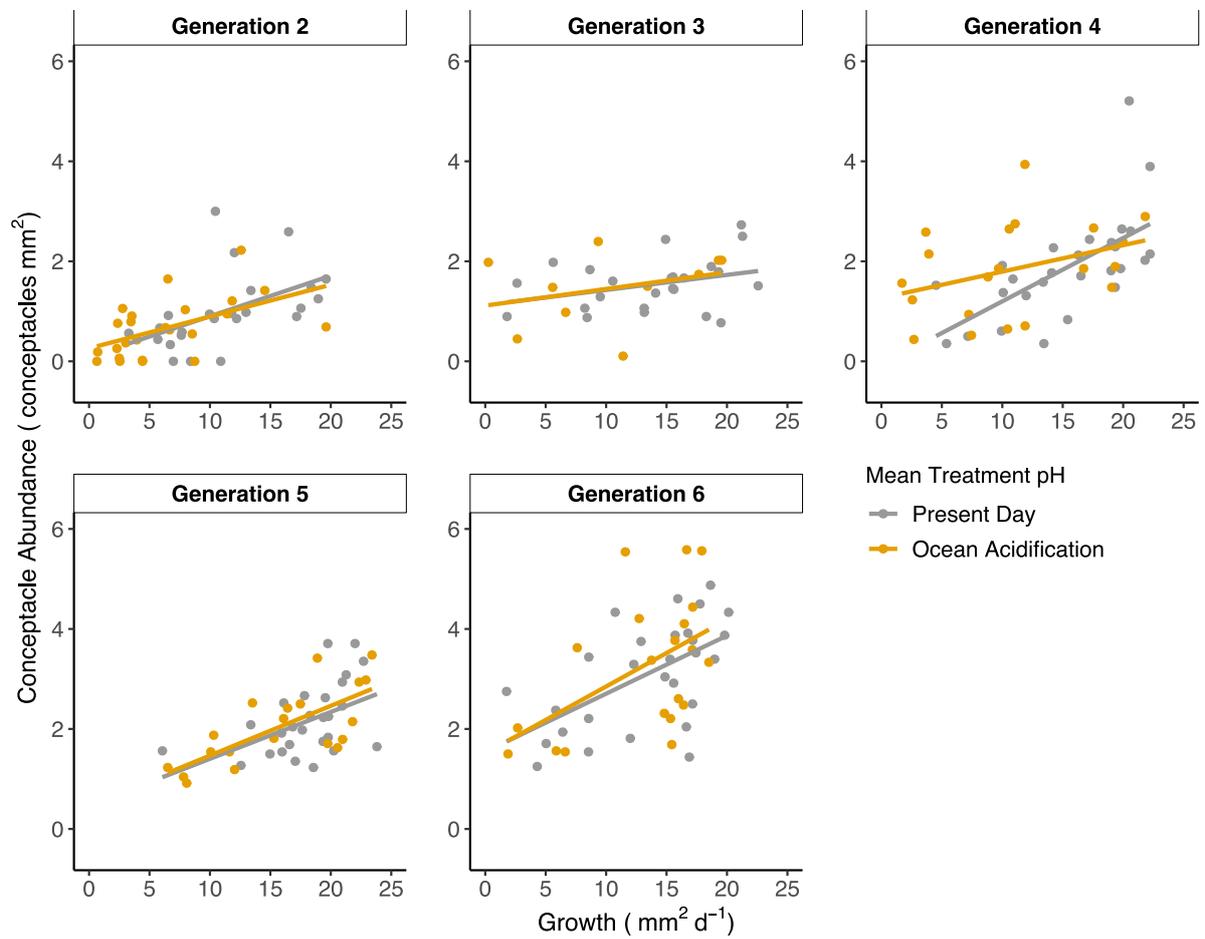
**Figure S3.** Diagram of the four pH treatments attained in the experimental tanks. Modified from Cornwall *et al.*, 2018.



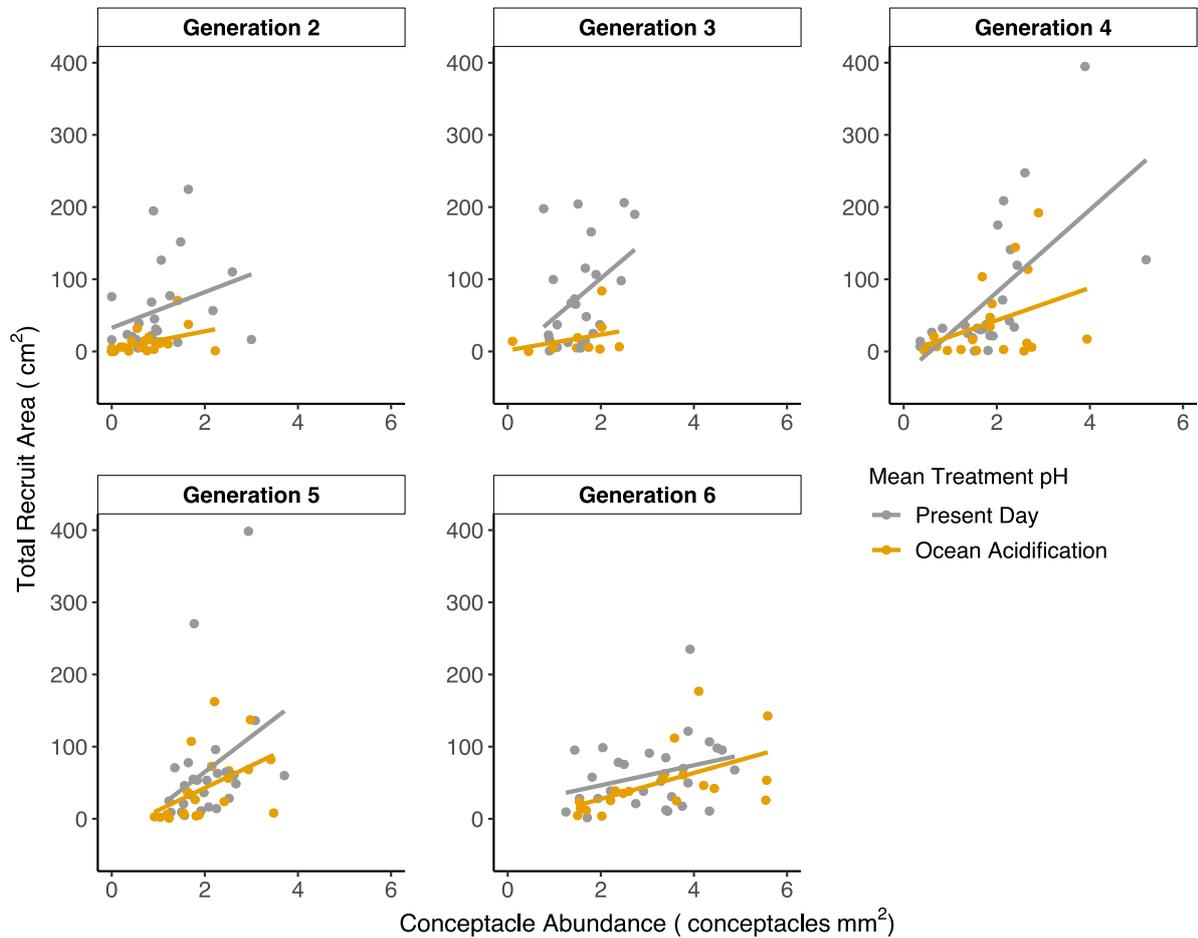
**Figure S4.** Schematic demonstrating the experimental-setup and how each new generation of coralline algae was formed. Wild generation 1 coralline algae (a) released spores (b) which then settled onto the walls of experimental tanks (c). Sections of the tank containing these new recruits (orange rectangle) were then cut out and placed into a completely new experimental tank. These generation 2 algae (orange rectangles) then released spores which settled on the walls of the tank (green rectangles), forming generation 3 recruits. 7 weeks after the transfer of generation 2 recruits to the new tanks, sections of the tank containing generation 3 recruits (green rectangles) were cut from the tank and placed in a new experimental tank. This process was repeated for each generation every 41-51 days. Modified from Cornwall *et al.*, 2020.



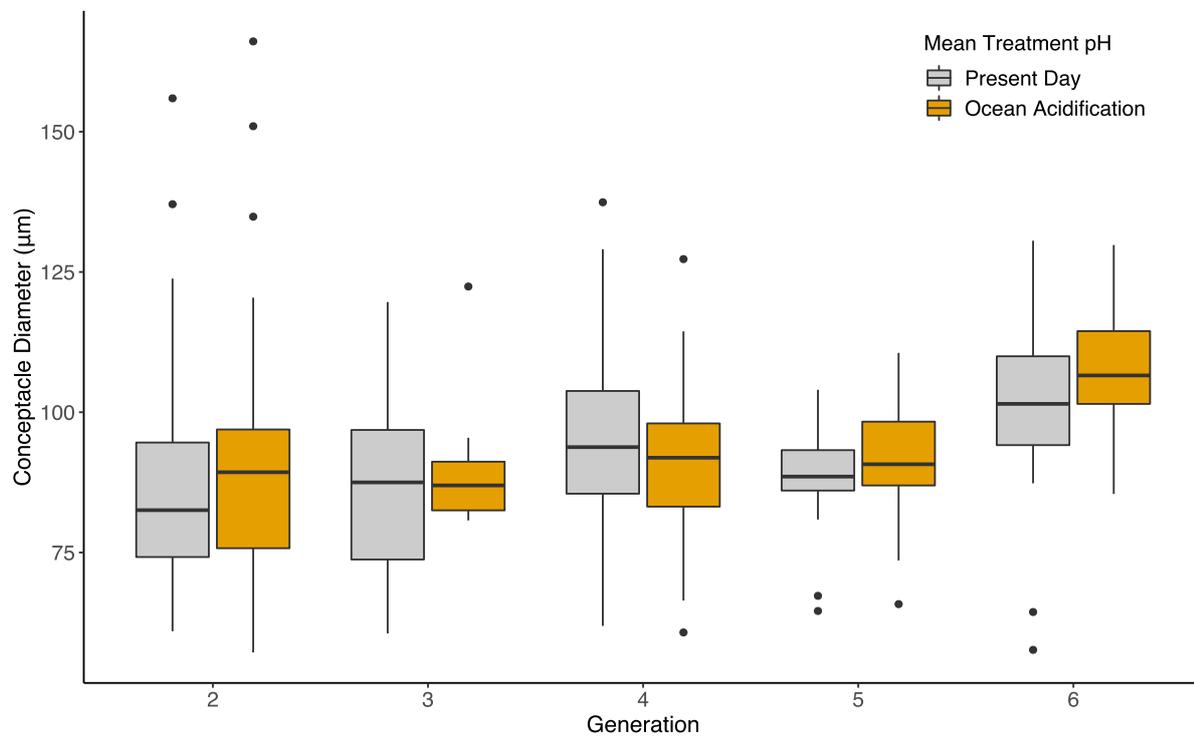
**Figure S5.** *H. reinboldii* conceptacle abundance after exposure to present-day (mean pH 8.00) and ocean acidification (mean pH 7.70) treatments for two to six generations. Responses to low and high variability pH treatments are combined. Median, 25% and 75% quartiles are displayed.



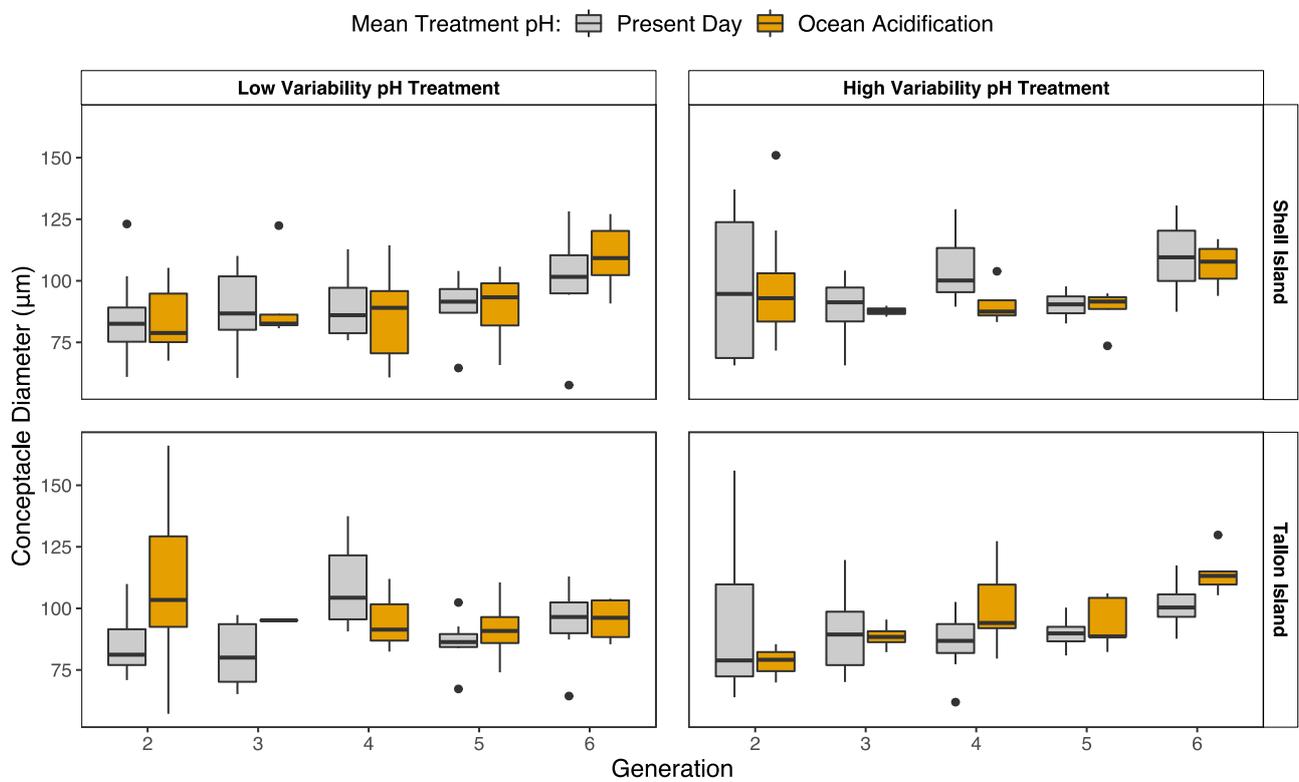
**Figure S6.** *H. reinboldii* growth rates (linear extension) vs the conceptacle abundance of the same coralline algae after exposure to present day (mean pH 8.00) or ocean acidification (mean pH 7.70) treatments. Plots are split by generation (2–6). Each point represents the mean growth rate and mean conceptacle abundance of coralline algae from one experimental tank. Responses to low and high variability pH treatments are combined. Growth rate data from Cornwall *et al.*, [18].



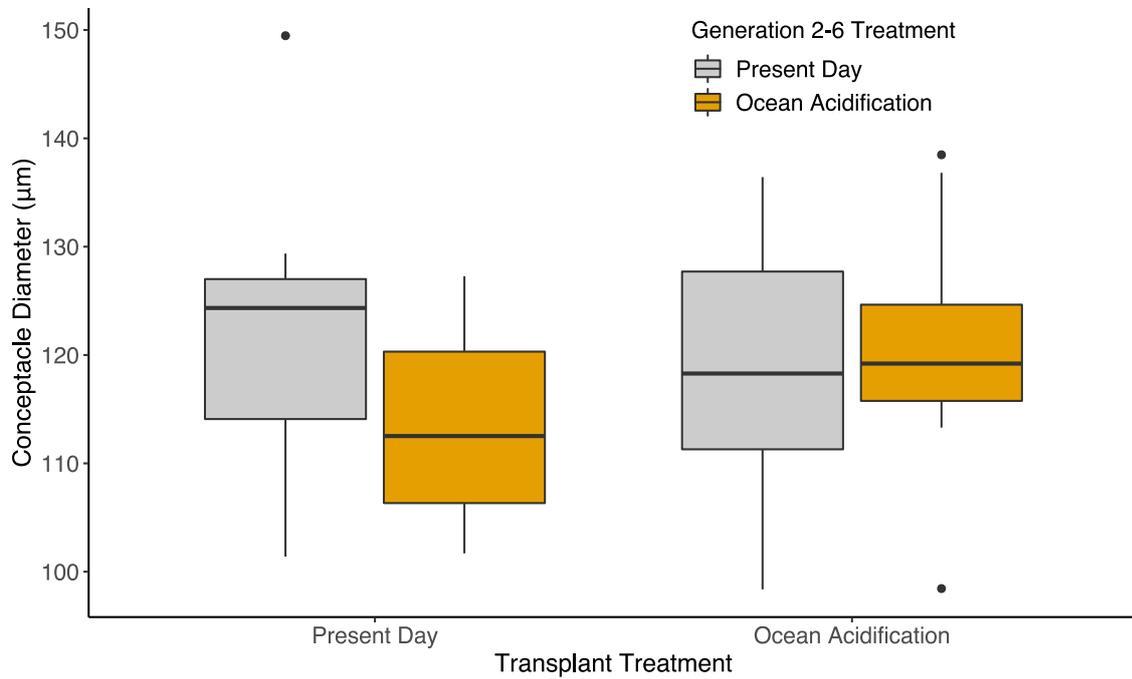
**Figure S7.** *H. reinboldii* conceptacle abundance vs the total recruit area of the next generation after exposure to present day or ocean acidification treatments. Plots are split by generation (2–6). Each point represents the mean total recruit area and mean conceptacle abundance of coralline algae from one experimental tank. Responses to low and high variability pH treatments are combined. Recruitment data from Cornwall *et al.*, [18].



**Figure S8.** Diameters of individual conceptacles after exposure to present day (mean pH 8.00) and ocean acidification (mean pH 7.70) treatments for between two to six generations. Responses to low and high variability pH treatments are combined. Median, 25% and 75% quartiles are displayed.



**Figure S9.** *H.reinboldii* conceptacle diameter after exposure to present-day (mean pH 8.00) and ocean acidification (mean pH 7.70) treatments for between two and six generations. Figures are split by site of origin (Shell or Tallon Island) and variability of pH treatment (low or high). Median, 25% and 75% quartiles are presented.



**Figure S10.** Results from reciprocal transplant experiment. Conceptacle diameter of *H. reinboldii* after seven generations of exposure to present-day and ocean acidification treatments (same generation 2–6 treatment and transplant treatment), and those transplanted to novel treatments in generation seven (different generation 2–6 and transplant treatment). Responses to low and high variability pH treatments are combined. Median, 25% and 75% quartiles are displayed.