Table S1. Table including the location information for the study sites used in the study

Island	Site	Latitude	Longitude
Enderbury	SR	–3.1249	–171.09335
Enderbury	LP	–3.11822	–171.09286
Nikumaroro	SWC	–4.67962	–174.53928
Nikumaroro	L	–4.67455	–174.54369
Howland	11	0.79877	–176.62025
Howland	14	0.81485	–176.62393
Millenium	01	–9.97102	–150.22160
Millenium	05	–9.98792	–150.23270
Vostok	02	–10.06019	–152.31497
Vostok	03	–10.05809	–152.30956
Flint	01	–11.43118	–151.82480
Flint	04	–11.41927	–151.82724

Table S2. Tools used in TagLab to mark and segment colonies

Tool	Use
4-clicks segmentation & Freehand segmentation tools	To initially mark the edges of the colony
Positive/negative clicks segmentation & Edit border tools	To clean up the edges around colonies

Table S3. This table, adapted from Darling et al. (2012), shows how the species used in our analysis were competitively classified

Weedy	*Montipora aequituberculata*
	Montipora hoffmeisteri
	Montipora sp.
	Montipora verrilli
	Pocillopora damicornis
Competitive	Branching *Acropora*
	Pocillopora eydouxi
	Pocillopora meandrina/verrucosa
	Pocillopora zelli
Stress-Tolerant	*Goniastrea stelligera*
	Fungia sp.
	Goniastrea retiformis
	Halomitra pileus
	Hydnophora microconos
	Pavona clavus
	Platygyra pini
	Porites annae
	Porites australiensis
	Porites lobata/lutea
	Porites sp.
Generalist	*Echinopora gemmacea*

Table S4. Statistics for Wilcoxon tests for Figure 4A

Island	W	p value
Enderbury	4823.5	1.99e–05*
Nikumaroro	3147	0.05
Howland	8428.5	8.60e–08*
Millennium	2067	0.001*
Vostok	4287	0.28
Flint	6508.5	6.63e–05*

Table S5. Statistics for Wilcoxon tests for Figure 4B

Island	Site	W	p value
Enderbury	Lone Palm	886	2.58e–05*
	Short Ride	1569.5	0.08
Nikumaroro	Landing	580	0.05
	South West Corner	1024.5	0.38
Howland	Site 11	2059	3.88e–07*
	Site 14	2193	0.005*
Millennium	Site 01	1367	0.39
	Site 05	1182	0.0005*
Vostok	Site 02	927	0.02*
	Site 03	1254	0.26
Flint	Site 01	1179	0.88
	Site 04	2048	3.80e–08*

Table S6. Regression statistics for Fig. S4A multiple regression

Coefficient	Estimate	SE	*t* value	Pr(>|*t*|)
Intercept	200.52	16.9	5.42	8.55e–08
Area 1	–0.94	0.02	–58.85	<2e–16
Flint	269.79	51.93	5.20	2.79e–07
Howland	74.20	51.08	1.45	0.15
Millennium	4.03	48.86	0.08	0.93
Nikumaroro	–70.32	56.97	–1.23	0.22
Vostok	20.90	51.76	0.40	0.69

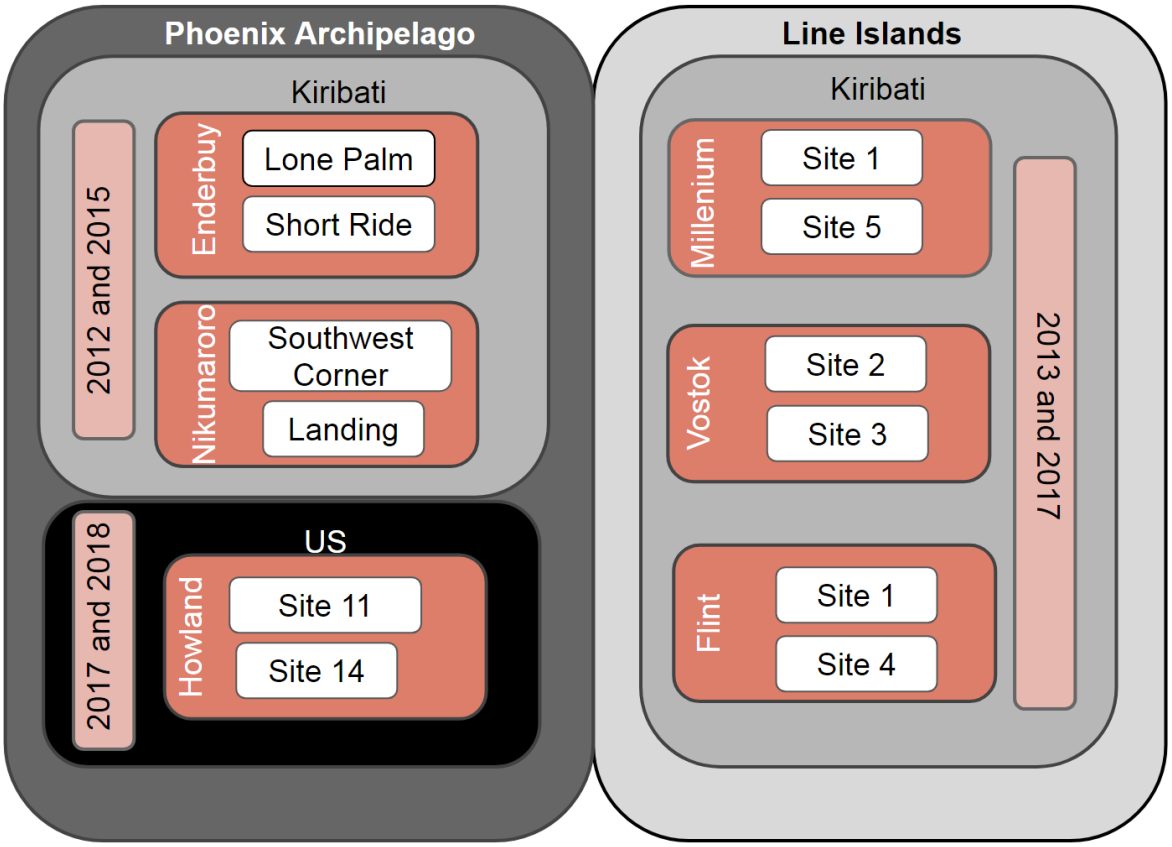

Fig. S1. The schematic of the sites used. Sites on the left are in the Phoenix Archipelago and sites on the right are in the Line Islands. The years on the side indicate the years that data was collected.

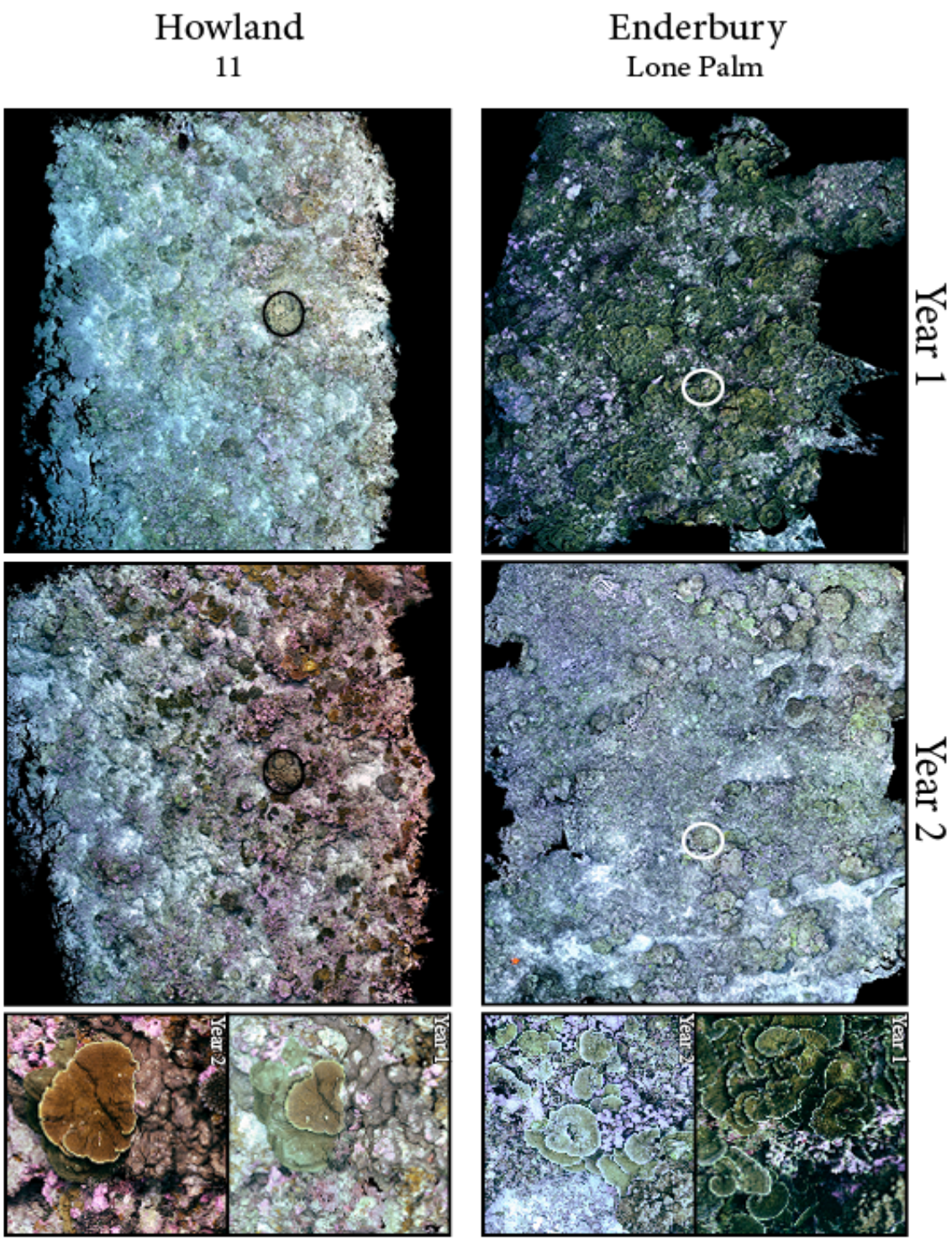

Fig. S2. This figure shows examples of a site that declined between years (Enderbury) and a site that showed growth (Howland). Each site has the orthoprojected mosaics that were used on the left, as well as zoomed in examples of colonies on the right. The circles show a colony that can be found in both years as a point of orientation.

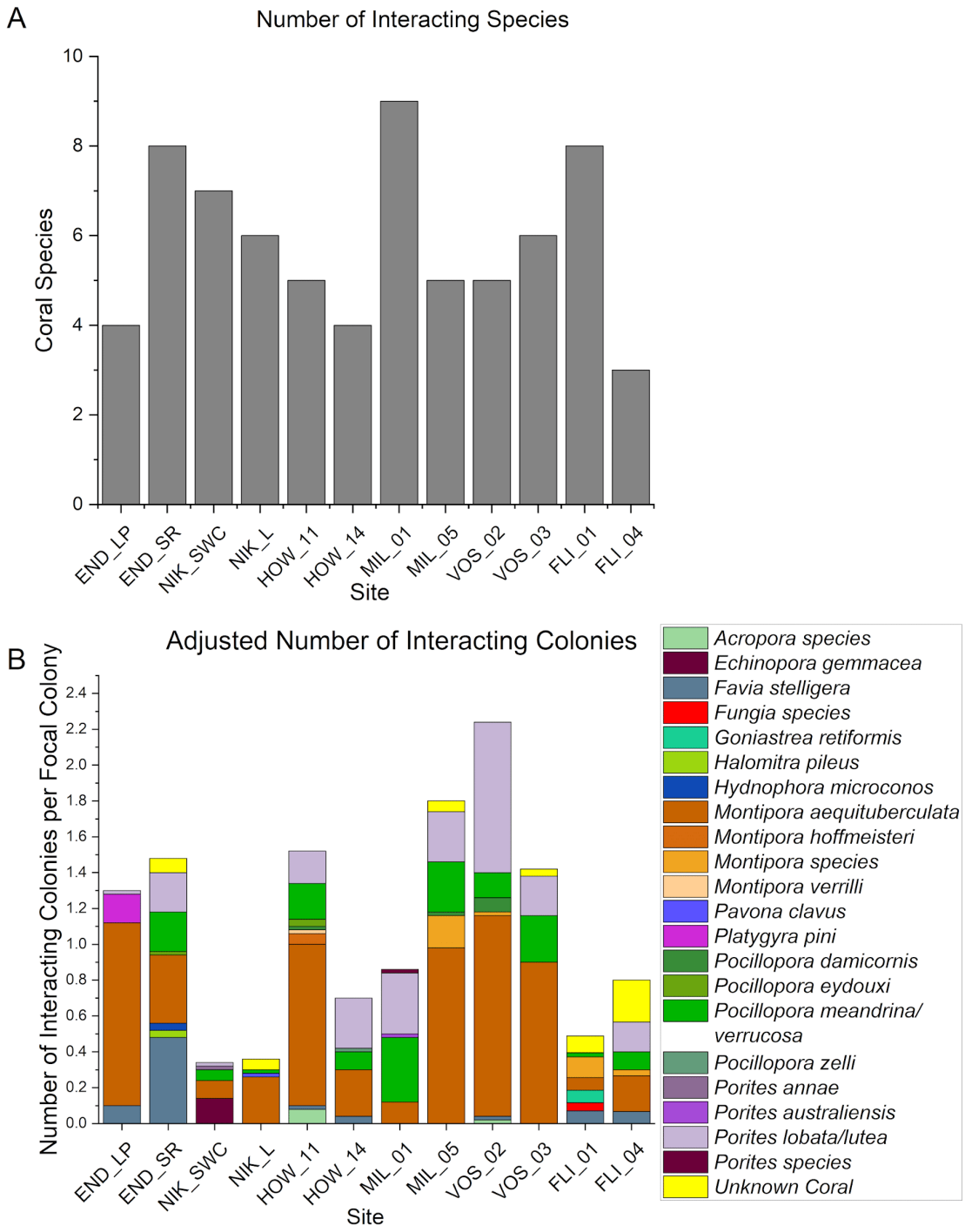

Fig. S3. Species interacting with the focal colonies. This figure shows the species of coral that the colonies of interest interacted with at each site. **(A)** Number of coral species that interacted with the focal colonies in any year, either overgrowing focal colonies or being overgrown by them. A chi square test found no differences across sites ($X^2_{11, 12} = 3.88$, $p = 0.973$), islands ($X^2_{5, 6} = 1$, $p = 0.962$), or archipelagos ($X^2_{1, 2} = 0.310$, $p = 0.578$). **(B)** Number of colonies of each species that interacted with the focal colonies across both years adjusted to the number of focal colonies used to account for the fact that there were too few colonies at the Nikumaroro sites to reach the target number of colonies. END = Enderbury, NIK = Nikumaroro, HOW = Howland, MIL = Millenium, VOS = Vostok, FLI = Flint

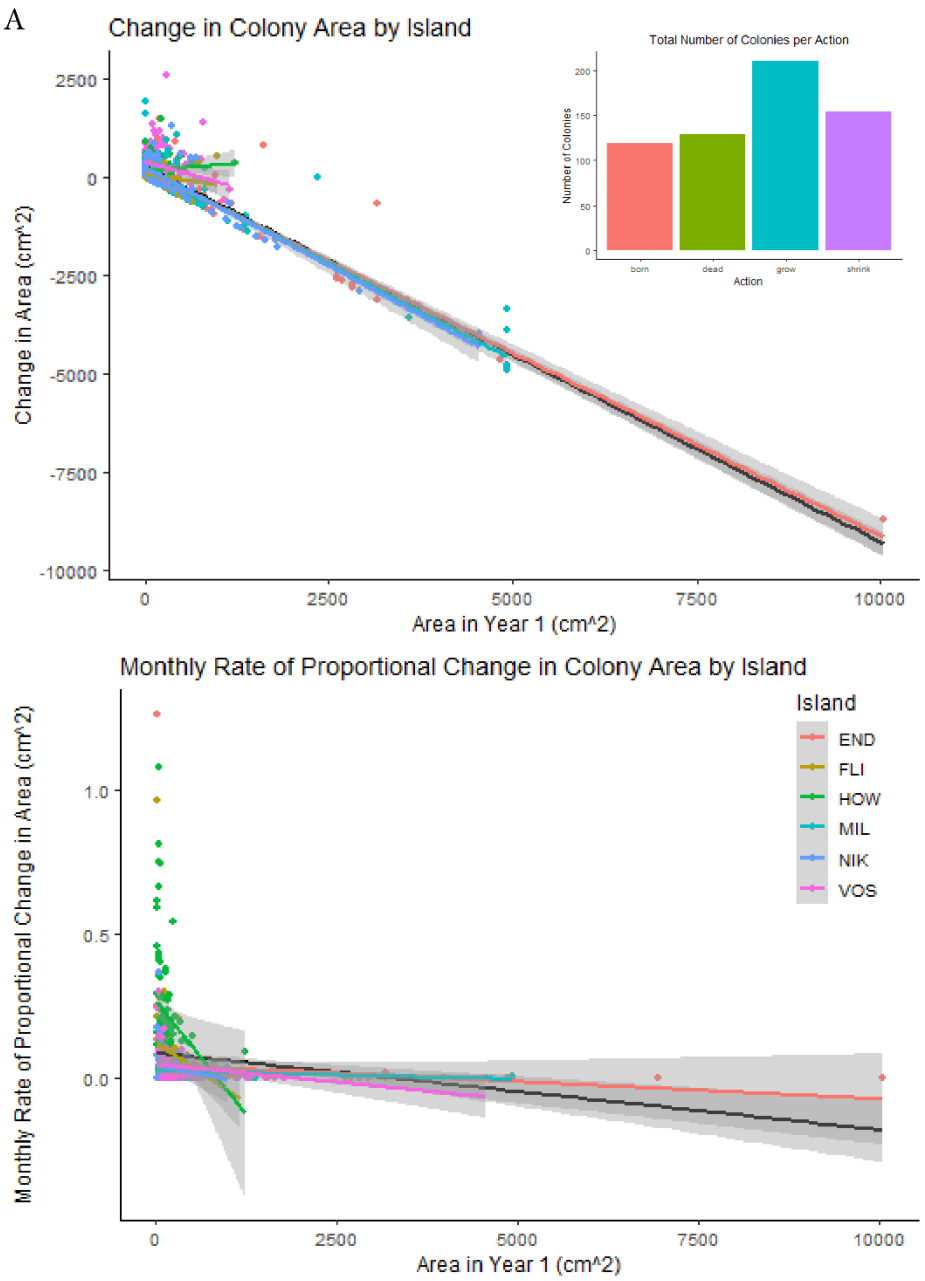

Fig. S4. (A) Change in focal colony area based on starting colony size in Year 1. Regression statistics are in Table S6. Inset: total number of focal colonies of each fate summed across islands. **(B)** The adjusted proportional change in focal colonies. This graph plots the change in area of focal colonies proportional to their starting area and normalized by the number of months between visits. For both plots, multiple linear regressions were run using Island and Area in Year 1 as the regressors, plotted in the color of the corresponding island. A simple regression is plotted as a black line. Regressions are plotted with a 95% CI. A Kruskal-Wallis test was used to compare the fates of colonies across all islands and found no difference between the fates of colonies.

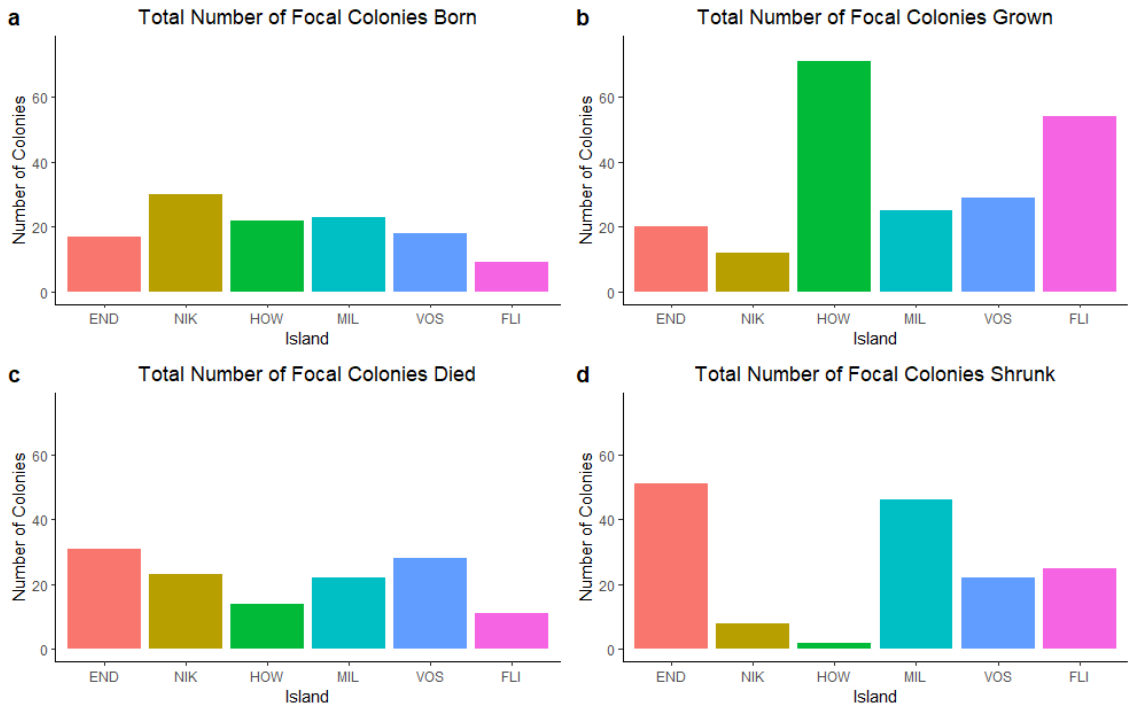

Fig. S5. The fates of the focal colonies tracked across years. Colonies born were only found in Year 2, colonies that died were only found in Year 1, and colonies that were in both years either grew or shrunk based on the change in surface area between visits. Kruskal-Wallis tests found no difference between the number of colonies with a certain fate across islands for any of the fates. n = 100 for all sites except Nikumaroro, which is n = 73.

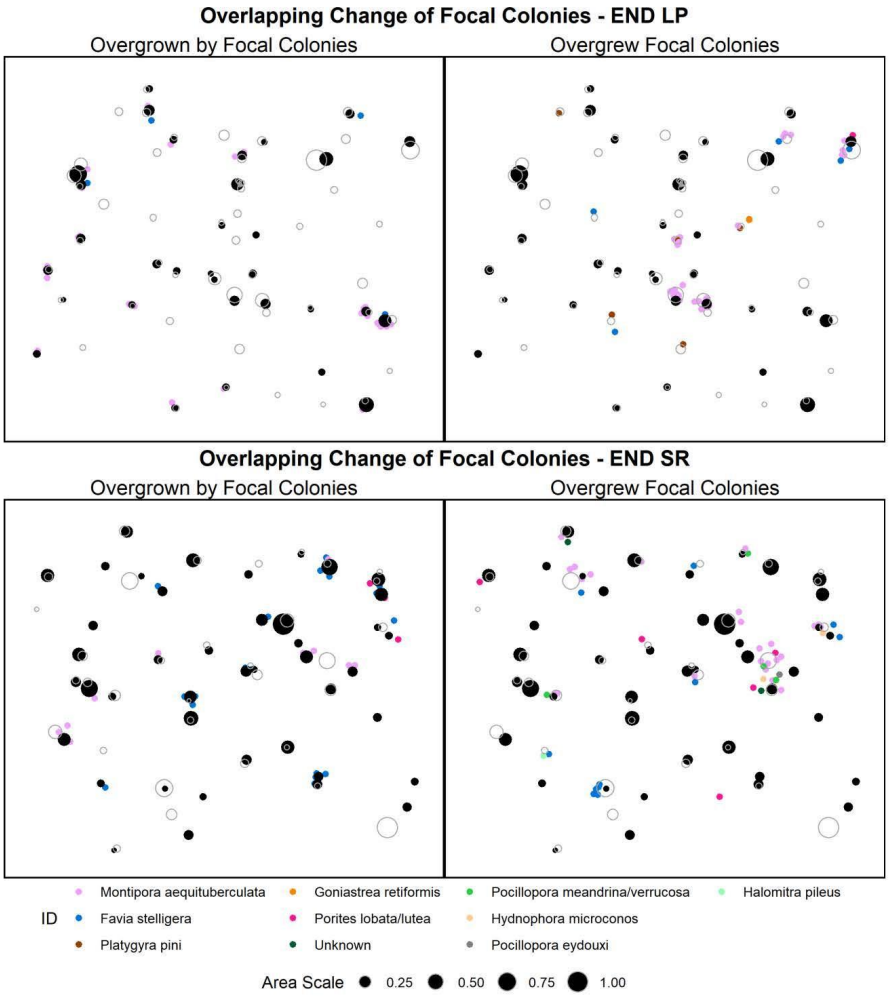

Fig. S6. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the location and species of colonies that overgrew the focal colonies.

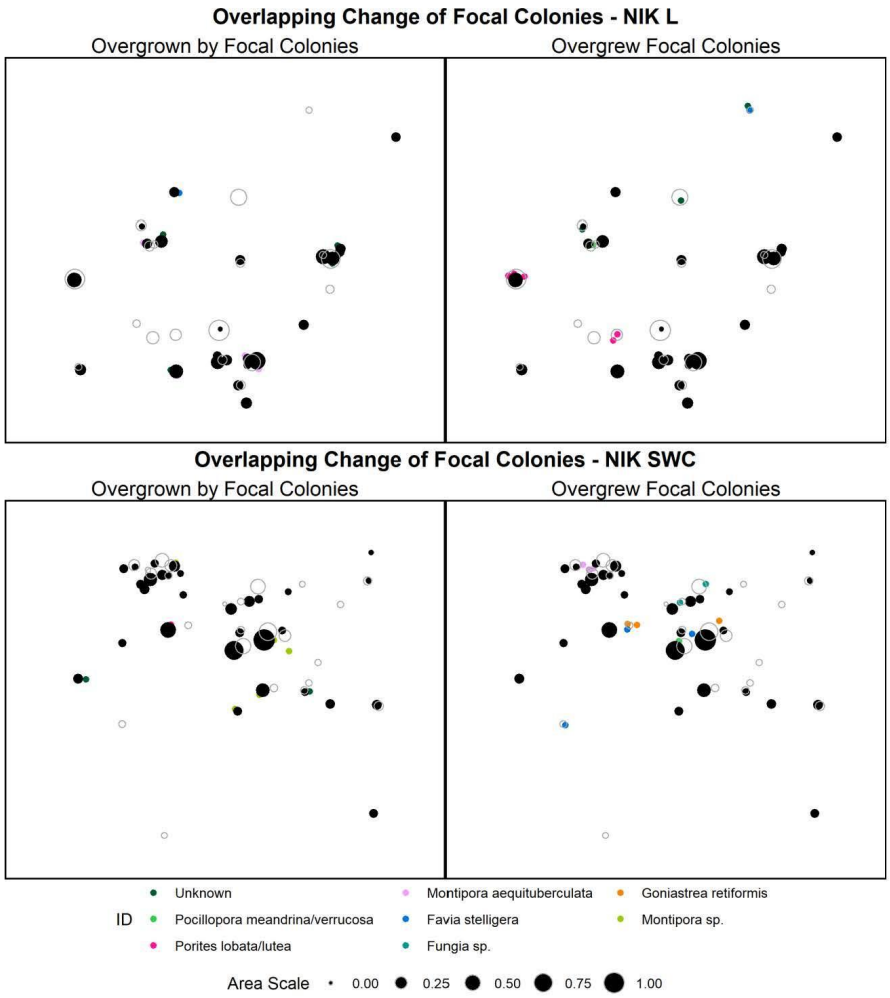

Fig. S7. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the location and species of colonies that overgrew the focal colonies.

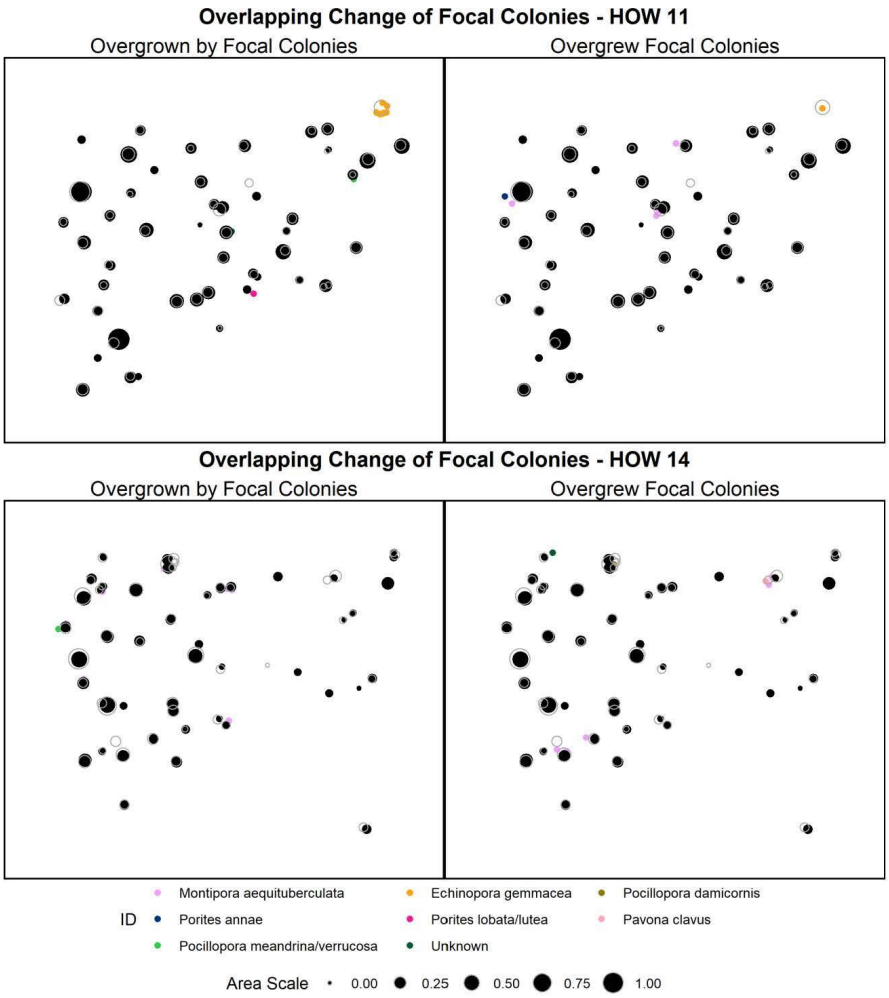

Fig. S8. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the location and species of colonies that overgrew the focal colonies.

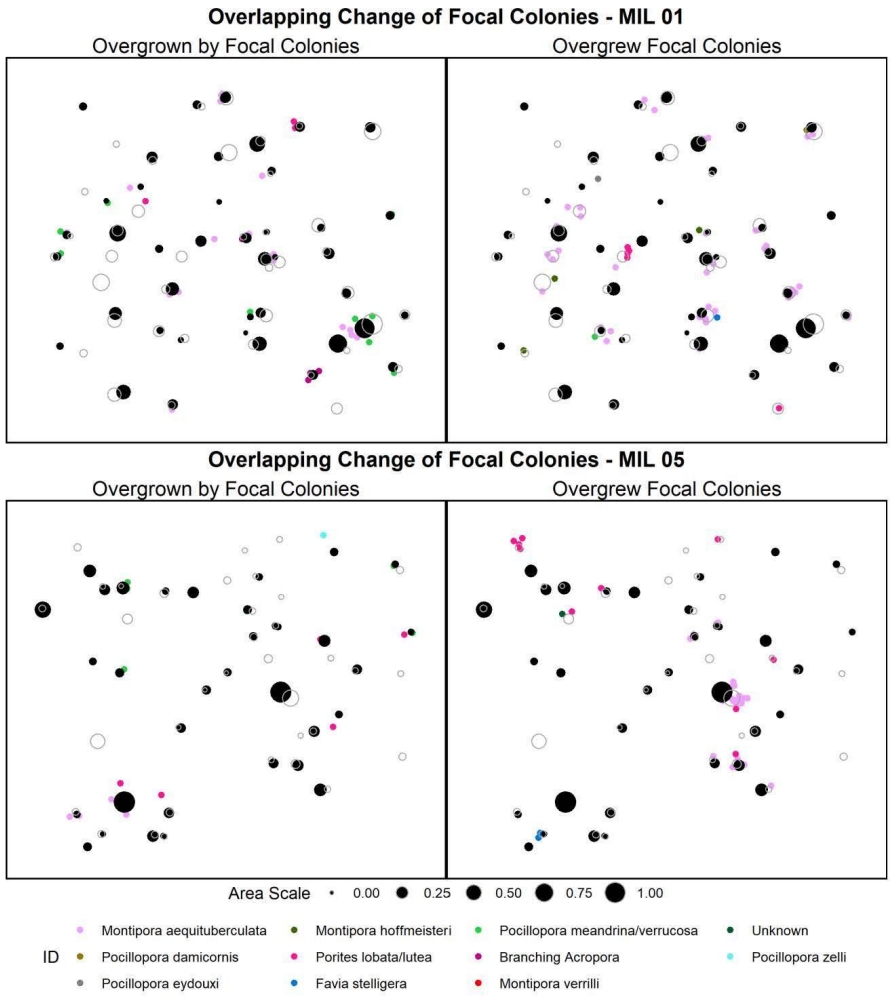

Fig. S9. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the location and species of colonies that overgrew the focal colonies.

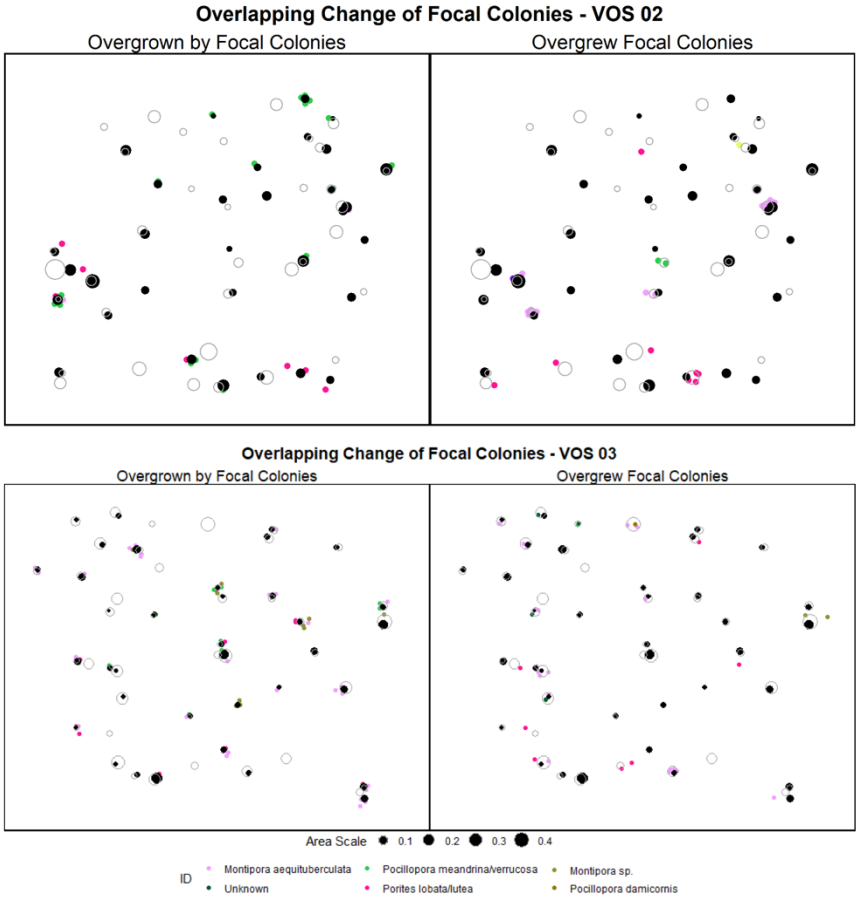

Fig. S10. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the location and species of colonies that overgrew the focal colonies.

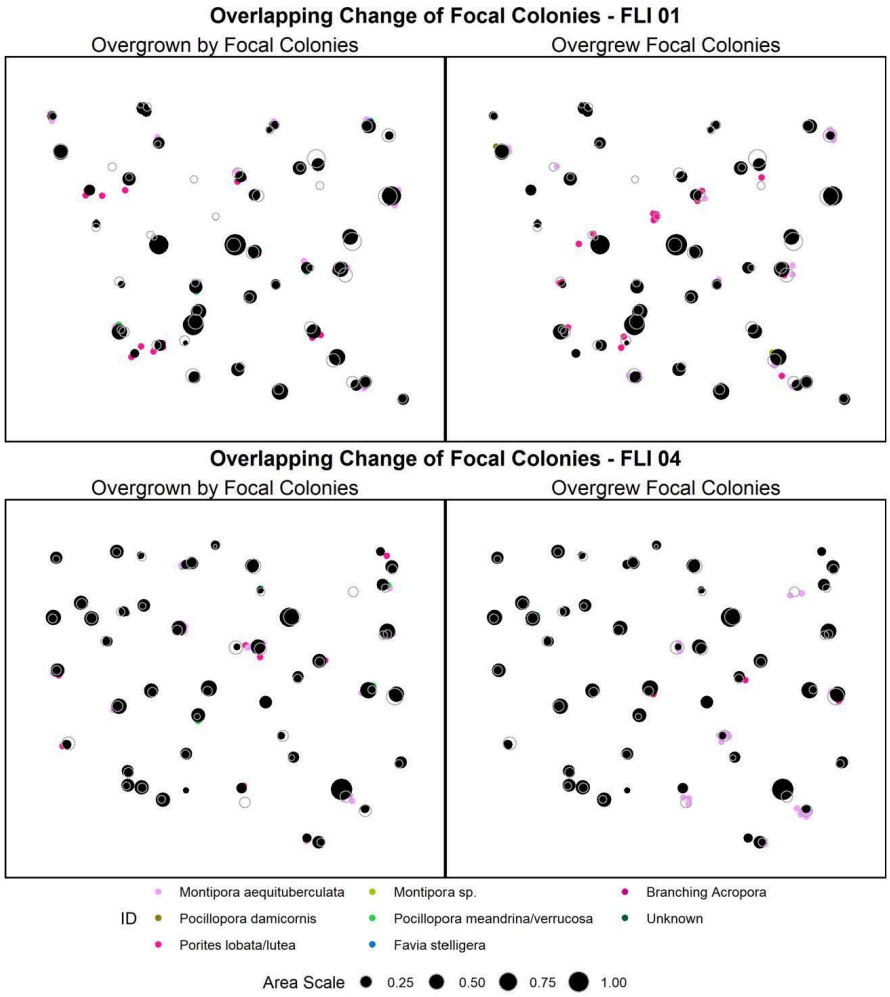

Fig. S11. The interactions of focal colonies with surrounding colonies. The size and center location of focal colonies the first year is shown with the grey circle, and the colony in the second year is marked with the black dots. Colored dots on the left mark the location and species of colonies that were overgrown by the focal colonies, and colored dots on the right mark the ocation and species of colonies that overgrew the focal colonies.

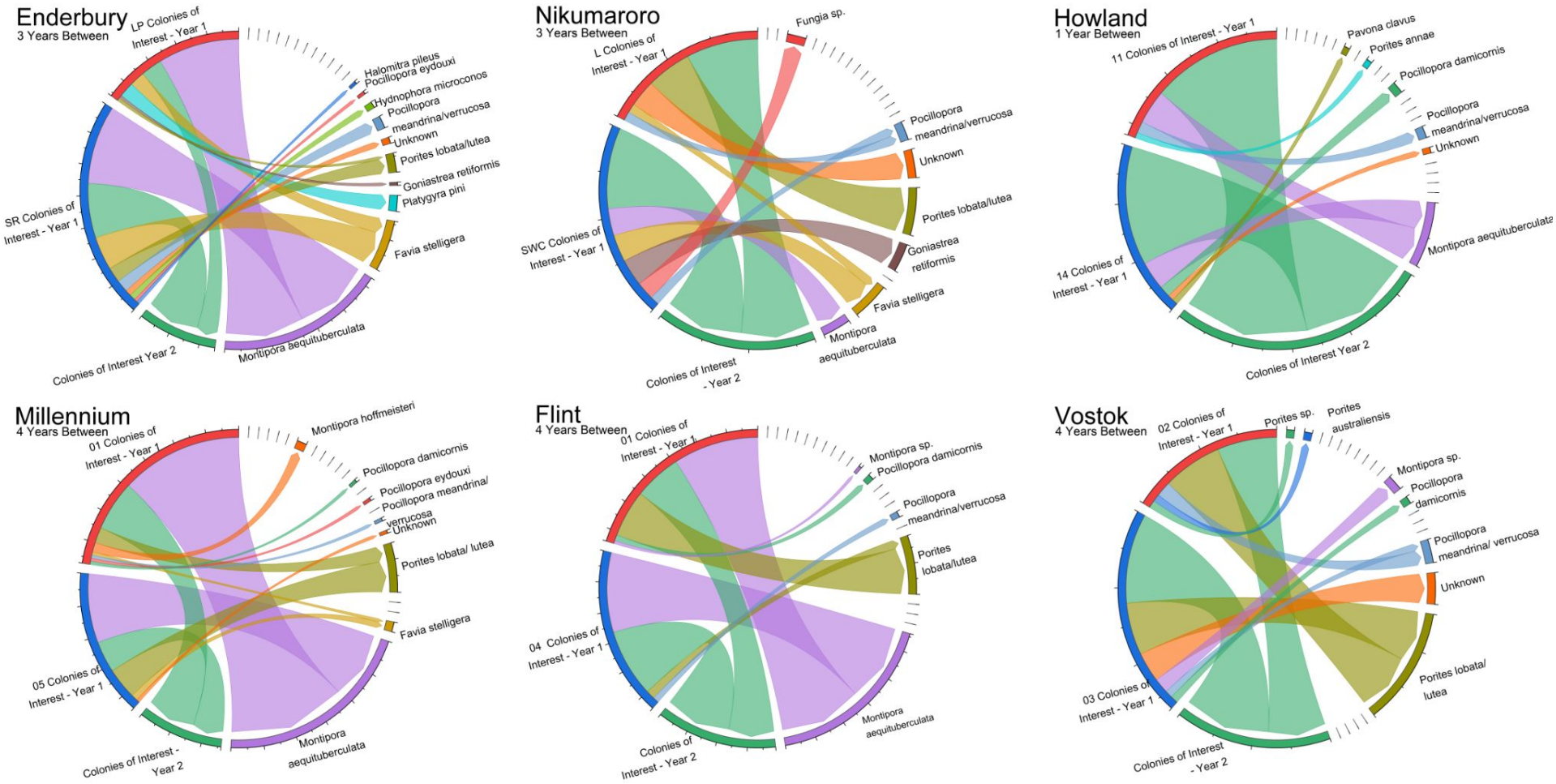

Fig. S12. The placeholder replacements for the focal colonies from the first year. This chord diagram shows what species were found in the second year replacing space held by focal colonies in the first year. The colors indicate the species of the replacement colony, and the width of the link corresponds to the number of colonies of that species. A larger wedge on the right-hand side represents more colonies of that species overgrowing the focal colonies. Islands in the top row are part of the Phoenix Islands and islands in the lower row are from the Line Islands