Southeast Florida Coral Reef Evaluation and Monitoring Project

Executive Summary 2025

Overview

- The Southeast Florida Coral Reef Evaluation and Monitoring Project (SECREMP) documents the status and trends within the Kristin Jacobs Coral Aquatic Preserve (KJCAP) reef system, which spans Miami-Dade, Broward, Palm Beach, and Martin counties, and in 2025 completed its 23rd year of annual surveys.

- Survey methods include (1) photographic transects to quantify percent cover of major benthic taxa (stony corals, sponges, octocorals, macroalgae, etc.) and (2) demographic surveys to quantify abundance, size distribution, and overall condition of stony corals (Scleractinia), octocorals (Octocorallia), and *Xestospongia muta* (giant barrel sponge).

- In 2025, all 22 SECREMP sites were surveyed through established methodologies (see Leinbach et al. 2025 for site locations and survey protocols). Twenty sites were monitored within four permanently marked 22 m x 1 m stations at each site (Figure 1). At the remaining two sites, the Martin County sites, stony coral transect surveys were modified to only include the first 10 meters of the transect, due to tidally influenced timing constraints and the large abundance of small *Porites astreoides* colonies. The octocoral, *Xestospongia muta*, and photo transect surveys at all sites were performed according to the established methods presented by Leinbach et al. (2025).

- This Executive Summary focuses on stony coral demographic data collected in 2025. Octocoral and *X. muta* density data and stony coral, octocoral, sponge, and macroalgae 2025 benthic cover data are also presented to provide brief resource status information for these coral reef community functional groups.

- Statistical comparisons for stony coral density, disease prevalence, stony coral colony live tissue area, *X. muta* density, and octocoral density were selectively performed region-wide (pooling all sites) and for sites (with stations as replicates). A linear mixed effects model (LME) with year as the factor was used to examine changes between 2013 – 2025 within sites. All statistical tests were performed using the R software package (R Core Team 2016). For sites exhibiting statistical differences between years, a Tukey's HSD post-hoc test was performed and significant differences are reported based on Tukey's multiple comparison corrected *p*-values.

- For Martin County sites, starting in 2023, stony coral density was calculated based on only the first 10 meters and is thus directly comparable to previous years' density measurements, as density controls for area surveyed. Live tissue area (LTA) measurements were not standardized

to area surveyed: any significant change in live tissue area is interpreted within the context of a shorter transect distance.

- Percent cover changes from 2024 to 2025 for the major benthic taxa (stony corals, sponges, octocorals, and macroalgae) were analyzed using generalized linear mixed models in R version 4.5.2. For each taxon, percent cover estimates were modeled using a logistic regression, with year, site, and their interaction as fixed effects. Station was included as a random effect in each model to account for the repeated measures survey design. A pairwise post-hoc analysis was conducted to examine significant site-level changes. A Bonferroni post-hoc adjustment was applied to the α value of 0.05 to account for the multiple comparisons being made at the site level: 22 comparisons were made for each taxon and α = 0.002273 was used to determine significance. No adjustment was made for regional comparisons.

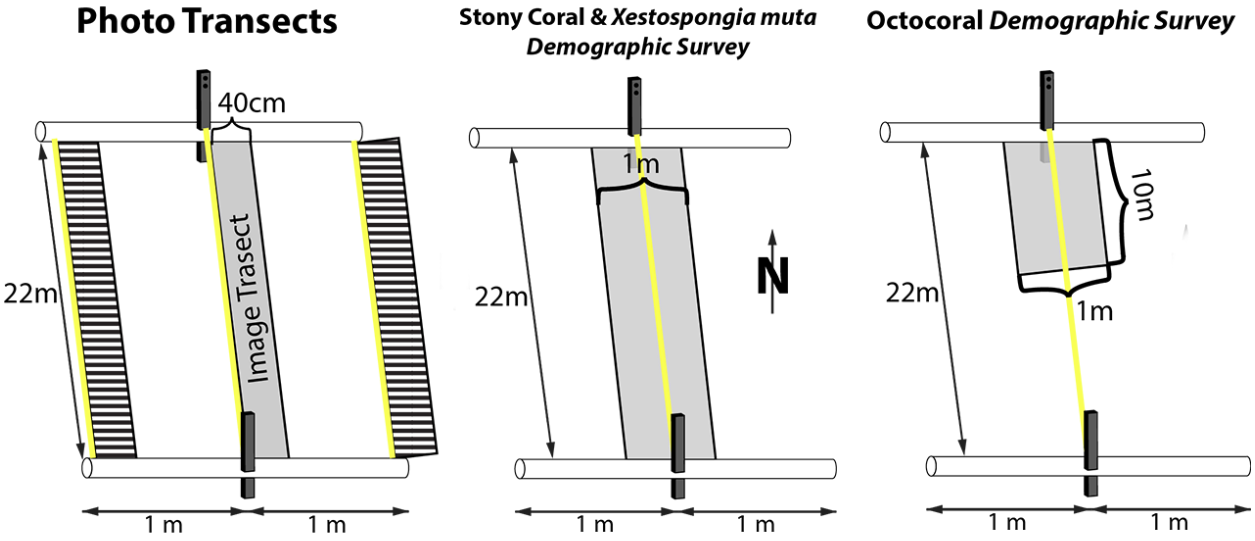

Figure 1. All SECREMP sites consist of four monitoring stations identified by permanent pins. Stations are 22 m x 1 m and are oriented north to south. Photo transects are taken along the east side of the station transect, surveying an 8.8 m^2 area. The hashed photo transects represent additional area surveyed prior to 2014 methods modifications; this area is still surveyed at site BCA. Stony coral and *X. muta* demographic surveys are 22 m x 1 m along the center of the station. Octocoral demographic surveys are 10 m x 1 m along the station center. All demographic surveys were implemented in 2012. Starting in 2023, only the first 10 meters of the stony coral transects were surveyed in Martin County.

Results and Discussion

Stony Coral Demographics

- Twenty-six stony coral species and species complexes were identified region-wide, which is similar to total richness identified throughout all project years (Leinbach et al. 2025).

- Region-wide mean (± SE) stony coral site density (colonies ≥4 cm) in 2025 was 2.40 ± 0.42 colonies/m^2 and mean (± SE) site density ranged from 0.20 ± 0.10 colonies/m^2 (site PB1) to 7.95 ± 0.68 (site BC4). Fourteen sites in 2025 had mean colony density less than 2 colonies/m^2, while four sites (MC1, BC4, DC1, and DC5) had mean colony density greater than 4 colonies/m^2 (Table 1).

- Regionally, stony coral density stayed relatively consistent from 2013 to 2015, dropping in 2016 to the lowest recorded regional density, which was during the height of the stony coral tissue loss disease (SCTLD) outbreak in Southeast Florida. Density has since increased, and regional density in 2024 and 2025 was significantly higher than all years 2013-2021 (Table 1).

- In 2025, only one site (PB1) had a significantly lower density compared to at least one previous year (Table 1). No sites had their minimum recorded density in 2025. Significant differences for all other year-by-year comparisons are presented in the 2024 comprehensive report (Leinbach et al. 2025).

- Colony density increases were also observed (Table 1). In 2025, seventeen sites (PB2, PB4, PB5, BC2, BC3, BC4, BC5, BC6, BCA, DC1, DC2, DC3, DC4, DC5, DC6, DC7, and DC8) had significantly greater densities than at least one previous year. Thirteen sites (PB5, BC2, BC3, BC4, BC5, BC6, DC1, DC3, DC4, DC5, DC6, DC7, and DC8) had their maximum recorded density in 2025. However, increases in density at these sites was primarily driven by increases in only a handful of species including *Porites astreoides, Porites porites,* and *Siderastrea siderea* (Table 2), which are considered to be generalist species that contribute minimally to reef structural complexity in Southeast Florida.

- *Porites astreoides, Siderastrea siderea, Agaricia agaricites, and Montastraea cavernosa* were the top four contributors to adult stony coral abundance in 2025 in Palm Beach, Broward, and Miami-Dade Counties, accounting for 73.6% of all corals (≥4 cm) recorded in the region in these locations in 2025. *Porites astreoides* was the most abundant coral species in 2025 (1104 colonies), followed by *S. siderea* (1007 colonies), *Agaricia agaricites* (536 colonies), and *Montastraea cavernosa* (452 colonies) (Table 2).

- Of the six most abundant species in Palm Beach, Broward, and Miami-Dade Counties in 2025, *Stephanocoenia intersepta* and *P. astreoides* have approximately doubled in abundance since 2013. *Siderastrea siderea* and *A. agaricites* complex abundance have approximately tripled since 2013. *Porites porites* abundance has increased almost eightfold since 2013. These five species all achieved their maximum abundance in 2025. *Montastraea cavernosa* abundance declined by 48% between 2013 and 2017, following the peak of the SCTLD outbreak, but has increased by 96% since 2017 (Table 2).

- Only three coral species (≥4 cm) were observed in Martin County in 2025. *Porites astreoides* and *Siderastrea siderea* dominated stony coral abundance counts, comprising 96% of all corals (≥4 cm) recorded in Martin County in 2025. *Porites astreoides* was the most abundant coral species in 2025 (129 colonies), followed by *S. siderea* (60 colonies). *Siderastrea radians* was also observed, with only eight colonies recorded (Table 3).

- Because only the first 10 meters of the stony coral transects were surveyed in 2023-2025 in Martin County, the reported abundances are underestimations of the true value. *Porites astreoides* has experienced an approximately 16-fold increase in abundance since 2013, achieving maximum abundance in 2022 with 339 colonies. *Siderastrea siderea* abundance has decreased by 24% between 2013 and 2025: however, this is likely partly due to the decrease

in survey area. *Pseudodiploria clivosa*, which made up 16% of the stony coral abundance (≥4 cm) in Martin County in 2013, was not observed in 2025 (Table 3).

- Beginning in the summer of 2014, the KJCAP experienced an unprecedented stony coral disease event, with significant increases in SCTLD prevalence (Figure 2). Disease was first observed in Broward County in 2014, and elevated disease prevalence was subsequently observed across all counties. Miami-Dade and Broward Counties experienced the highest disease prevalence, although sites in Palm Beach and Martin Counties also experienced outbreaks. Regional disease prevalence peaked in 2016 but has since declined and remained below 1% since 2020 (Figure 2).

- In 2025, SCTLD was observed at four of the 22 sites: BC1, BC4, BCA, and DC1. This included four colonies at BC1, three colonies at DC1, and two colonies each at BC4 and BCA. This is a slight increase from 2024, when four *Montastraea cavernosa* colonies were recorded with SCTLD at BC1 (Leinbach et al. 2025).

- In 2025, species exhibiting SCTLD included *Montastraea cavernosa* (5 colonies), *Agaricia agaricites* (5 colonies), and *Porites astreoides* (1 colony).

- To provide an additional metric to evaluate changes to the stony coral community, colony width, height, and percent mortality (sum of old and recent) were used to calculate total stony coral live tissue area (LTA) for each site from 2013-2025 (see Leinbach et al. 2025 for more LTA calculation details). Region-wide LTAs were also calculated for different SCTLD susceptibility groups as defined by the NOAA Stony Coral Tissue Loss Disease Case Definition (2018).

- A region-wide decline in LTA was initially identified in 2016 following the peak of the SCTLD outbreak, and regional LTA from 2017-2025 was significantly lower than the LTA in 2013, 2014, and 2015. For most sites, LTA declined after 2016 and sites with significant losses were found across all counties and all habitats (Figure 3). No significant change in regional LTA has occurred from 2017 to 2025, despite increases in coral density (Table 1).

- Between 2013 and 2025, thirteen sites throughout Palm Beach, Broward, and Miami-Dade Counties saw significant changes in LTA (PB2, PB3, PB4, PB5, BC1, BC4, BC5, BC6, BCA, DC4, DC5, DC6, and DC8). Seven sites had significantly lower LTA in 2025 than at least one previous year (PB2, PB3, PB4, PB5, BC1, DC4, and DC6; Figure 3).

- For Martin County, LTA measurements from 2023 onward were calculated based on the first 10 meters of the survey transect and were directly compared to previous years. Between 2013 and 2025, only one site (MC2) saw a significant decline in LTA. MC2's LTA in 2025 was virtually unchanged compared to the previous year. Although not statistically significant, the large decline in LTA at MC1 seen between 2022 and 2023 can be attributed to the change in methodology surveying only the first 10 meters of the stony coral transect.

Table 1. 2013 – 2025 mean (± SE) SECREMP regional (R) and site stony coral colony density (colonies ≥4 cm/m²). Bolded site values indicate that the mean for 2025 is significantly higher (linear mixed effects model followed by a Tukey's HSD test) than the bolded years. Underlined site values indicate that the mean for 2025 is significantly lower (linear mixed effects model followed by a Tukey's HSD test) than the underlined years. Only significant differences from 2025 sample data are presented, significant differences for all other years are presented in the 2024 comprehensive report.

Site	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
R	**1.21 ± 0.17**	**1.26 ± 0.18**	**1.29±0.19**	**1.07 ± 0.18**	**1.35 ± 0.25**	**1.39 ± 0.23**	**1.54 ± 0.28**	**1.74 ± 0.32**	**1.71 ± 0.31**	1.92 ± 0.36	2.02 ± 0.34	2.22 ± 0.36	2.40 ± 0.42
MC1	0.95 ± 0.09	1.06 ± 0.11	0.98 ± 0.18	0.98 ± 0.31	2.18 ± 0.66	2.82 ± 0.78	3.70 ± 1.20	4.35 ± 1.32	4.89 ± 1.09	5.44 ± 1.01	5.68 ± 2.27	5.45 ± 2.11	4.23 ± 1.67
MC2	0.49 ± 0.06	0.40 ± 0.05	0.34 ± 0.09	0.27 ± 0.05	0.31 ± 0.08	0.11 ± 0.05	0.22 ± 0.05	0.32 ± 0.10	0.53 ± 0.13	0.51 ± 0.09	0.88 ± 0.27	0.65 ± 0.27	0.70 ± 0.26
PB1	0.23 ± 0.13	0.27 ± 0.13	0.28 ± 0.15	0.33 ± 0.14	0.25 ± 0.11	0.40 ± 0.15	0.40 ± 0.07	0.75 ± 0.18	0.34 ± 0.10	0.49 ± 0.12	0.50 ± 0.17	0.27 ± 0.07	0.20 ± 0.10
PB2	1.07 ± 0.15	1.24 ± 0.09	1.57 ± 0.31	1.07 ± 0.33	1.03 ± 0.42	0.86 ± 0.25	0.82 ± 0.14	**0.68 ± 0.13**	**0.72 ± 0.07**	0.84 ± 0.05	1.02 ± 0.11	1.65 ± 0.30	1.57 ± 0.30
PB3	1.05 ± 0.31	1.18 ± 0.34	1.11 ± 0.29	0.63 ± 0.22	0.68 ± 0.23	0.67 ± 0.19	0.73 ± 0.17	0.76 ± 0.24	0.76 ± 0.25	0.93 ± 0.28	1.01 ± 0.24	1.11 ± 0.27	0.98 ± 0.27
PB4	1.82 ± 0.38	1.63 ± 0.31	1.69 ± 0.30	**1.02 ± 0.27**	**1.01 ± 0.23**	**1.06 ± 0.24**	**1.01 ± 0.22**	**1.15 ± 0.30**	1.32 ± 0.29	1.28 ± 0.22	1.56 ± 0.30	1.88 ± 0.35	1.75 ± 0.33
PB5	2.30 ± 0.31	**2.18 ± 0.28**	**2.08 ± 0.29**	**1.58 ± 0.25**	**1.65 ± 0.32**	**1.75 ± 0.40**	**1.77 ± 0.34**	**1.85 ± 0.27**	**2.06 ± 0.30**	2.28 ± 0.21	2.60 ± 0.31	2.91 ± 0.48	2.99 ± 0.38
BC1	1.81 ± 0.35	2.16 ± 0.33	2.05 ± 0.34	1.66 ± 0.30	1.45 ± 0.34	1.40 ± 0.33	1.47 ± 0.33	1.70 ± 0.29	1.44 ± 0.30	1.47 ± 0.35	1.76 ± 0.44	1.92 ± 0.38	1.85 ± 0.27
BC2	**0.64 ± 0.12**	**0.78 ± 0.12**	**0.63 ± 0.12**	**0.47 ± 0.10**	**0.58 ± 0.13**	**0.95 ± 0.19**	**0.82 ± 0.10**	**1.11 ± 0.12**	**0.92 ± 0.13**	**0.95 ± 0.11**	1.22 ± 0.13	1.35 ± 0.13	1.51 ± 0.18
BC3	**0.75 ± 0.11**	**0.76 ± 0.22**	**0.59 ± 0.08**	**0.42 ± 0.03**	**0.61 ± 0.04**	0.83 ± 0.09	**0.72 ± 0.03**	0.85 ± 0.09	0.93 ± 0.06	0.92 ± 0.08	1.06 ± 0.05	1.04 ± 0.07	1.20 ± 0.05
BC4	**3.28 ± 0.32**	**3.75 ± 0.22**	**4.05 ± 0.31**	**3.41 ± 0.12**	**4.89 ± 0.41**	**3.83 ± 0.18**	**4.43 ± 0.16**	**5.03 ± 0.23**	**4.74 ± 0.29**	**5.69 ± 0.38**	**5.94 ± 0.60**	**5.88 ± 0.56**	7.95 ± 0.68
BC5	**1.23 ± 0.19**	**1.09 ± 0.25**	**1.19 ± 0.22**	**0.67 ± 0.08**	**0.83 ± 0.14**	**0.89 ± 0.11**	**1.01 ± 0.26**	**1.18 ± 0.16**	**1.06 ± 0.12**	**1.35 ± 0.08**	1.78 ± 0.22	1.97 ± 0.25	2.20 ± 0.24
BC6	**0.64 ± 0.11**	**0.57 ± 0.08**	**0.56 ± 0.06**	**0.43 ± 0.05**	**0.41 ± 0.00**	**0.45 ± 0.12**	**0.50 ± 0.09**	**0.59 ± 0.13**	**0.69 ± 0.17**	**0.68 ± 0.17**	**0.91 ± 0.14**	1.14 ± 0.13	1.23 ± 0.16
BCA	**0.61 ± 0.18**	**0.58 ± 0.17**	1.09 ± 0.40	1.45 ± 0.17	3.08 ± 1.10	3.47 ± 1.15	3.66 ± 1.28	4.95 ± 1.44	2.58 ± 0.72	2.52 ± 0.58	2.26 ± 0.53	3.06 ± 0.78	3.24 ± 0.69
DC1	**1.80 ± 0.15**	**2.10 ± 0.16**	**2.14 ± 0.03**	**2.36 ± 0.06**	**2.28 ± 0.13**	**2.70 ± 0.27**	**2.81 ± 0.10**	**3.36 ± 0.24**	**3.51 ± 0.33**	**4.38 ± 0.55**	**4.91 ± 0.49**	5.51 ± 0.66	6.48 ± 0.59
DC2	**0.88 ± 0.09**	**1.08 ± 0.14**	**1.07 ± 0.11**	**0.83 ± 0.09**	**1.03 ± 0.04**	**1.10 ± 0.10**	1.16 ± 0.06	**1.07 ± 0.11**	1.34 ± 0.11	**1.14 ± 0.11**	1.20 ± 0.12	1.51 ± 0.04	1.48 ± 0.12
DC3	**0.31 ± 0.09**	**0.33 ± 0.03**	**0.31 ± 0.06**	**0.27 ± 0.07**	**0.28 ± 0.01**	0.44 ± 0.03	0.42 ± 0.01	0.48 ± 0.06	0.41 ± 0.05	0.45 ± 0.04	0.53 ± 0.04	0.53 ± 0.09	0.64 ± 0.10
DC4	**0.73 ± 0.11**	**0.75 ± 0.12**	**0.75 ± 0.20**	**0.57 ± 0.14**	**0.90 ± 0.18**	**0.90 ± 0.10**	**0.91 ± 0.11**	**0.95 ± 0.08**	**1.18 ± 0.10**	1.34 ± 0.09	1.47 ± 0.08	1.53 ± 0.07	1.60 ± 0.07
DC5	**2.56 ± 0.24**	**2.53 ± 0.14**	**2.33 ± 0.26**	**2.40 ± 0.26**	**3.28 ± 0.35**	**2.94 ± 0.41**	4.01 ± 0.57	3.64 ± 0.48	4.73 ± 0.59	5.54 ± 0.62	3.77 ± 0.40	4.49 ± 0.59	5.25 ± 0.79
DC6	**1.38 ± 0.26**	**1.42 ± 0.25**	**1.51 ± 0.25**	**1.44 ± 0.33**	**1.55 ± 0.35**	**1.51 ± 0.25**	**1.58 ± 0.27**	**1.45 ± 0.18**	**1.45 ± 0.25**	**1.75 ± 0.21**	2.24 ± 0.46	2.49 ± 0.38	2.88 ± 0.56
DC7	**1.13 ± 0.05**	**1.02 ± 0.12**	**1.10 ± 0.14**	**0.67 ± 0.09**	**0.85 ± 0.08**	**0.98 ± 0.14**	**1.14 ± 0.10**	1.30 ± 0.10	1.39 ± 0.13	1.34 ± 0.11	1.15 ± 0.03	1.33 ± 0.13	1.57 ± 0.08
DC8	**0.92 ± 0.09**	**0.81 ± 0.06**	**0.90 ± 0.14**	**0.56 ± 0.07**	**0.48 ± 0.05**	**0.60 ± 0.03**	**0.61 ± 0.06**	**0.73 ± 0.05**	**0.52 ± 0.03**	1.00 ± 0.03	**0.93 ± 0.07**	1.09 ± 0.10	1.28 ± 0.11

Table 2. Species abundance of stony coral colonies ≥4 cm by species from 2013 to 2025 across Palm Beach, Broward, and Miami-Dade Counties. "Region" is the total stony coral abundance of colonies ≥4 cm across all species by year. *Madracis* spp. includes *Madracis decactis* and *Madracis senaria*. Species with zero individuals recorded within the survey area in 2025 are excluded from the list, but are included in previous year tallies when present. Species abundance for Martin County can be found in Table 3 below.

Species	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Region	2207	2310	2375	1954	2388	2443	2636	2957	2824	3200	3330	3754	4211
Acropora cervicornis	8	22	17	19	19	8	9	9	13	13	19	11	12
Agaricia agaricites complex	170	177	226	249	454	431	522	631	465	523	358	444	536
Agaricia lamarcki	5	4	6	6	3	5	9	6	4	6	4	3	3
Cladocora arbuscula	0	0	0	0	0	0	0	0	0	0	0	0	2
Colpophyllia natans	9	7	10	3	2	1	2	4	2	2	2	2	2
Dichocoenia stokesii	75	78	56	8	5	10	17	23	23	34	42	44	42
Diploria labyrinthiformis	3	2	2	1	1	2	4	2	4	3	2	2	2
Eusmilia fastigiata	3	6	6	4	6	5	6	9	13	14	15	16	16
Madracis auretenra	28	43	73	67	67	42	33	16	14	25	27	63	62
Madracis spp.	39	43	41	33	41	46	43	52	47	46	42	41	28
Meandrina meandrites	114	119	87	5	12	14	28	26	31	35	30	38	34
Montastraea cavernosa	445	472	456	248	231	264	265	289	288	327	370	422	452
Mycetophyllia aliciae	5	4	6	4	4	7	8	9	9	11	14	10	12
Oculina diffusa	2	2	2	1	0	0	0	0	1	1	0	1	1
Orbicella annularis complex	22	21	24	24	21	12	16	13	14	13	18	19	13
Porites astreoides	538	559	555	608	695	691	752	764	797	838	928	1001	1104
Porites porites	51	79	116	114	151	119	160	180	189	255	269	354	406
Pseudodiploria clivosa	11	6	6	6	7	3	5	3	1	1	1	3	5
Pseudodiploria strigosa	11	12	10	3	4	5	4	8	7	10	9	14	12
Scolymia cubensis	3	0	0	1	3	1	2	2	1	3	5	3	7
Siderastrea radians	1	4	3	0	7	3	1	8	1	8	2	10	5
Siderastrea siderea	371	341	361	283	361	455	445	552	553	678	798	852	1007
Solenastrea bournoni	54	57	53	37	27	18	17	17	14	11	16	15	16
Stephanocoenia intersepta	239	252	258	229	267	299	286	333	333	342	359	386	432

Table 3. Species abundance of stony coral colonies ≥4 cm by species from 2013 to 2025 in Martin County. "Region" is the total stony coral abundance of colonies ≥4 cm across both Martin County sites. Note that beginning in 2023 the stony coral transect survey length was reduced from 22 meters to 10 meters; thus, these numbers likely underestimate the abundance of corals that are common at those sites, notably *Siderastrea siderea* and *Porites astreoides*.

Species	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Region	129	130	117	114	219	269	345	412	553	524	262	244	197
Isophyllia sinuosa	1	1	3	1	8	2	0	2	3	3	1	0	0
Mussa angulosa	0	0	0	0	0	0	0	0	1	0	0	0	0
Montastraea cavernosa	1	1	1	0	1	1	1	1	1	0	0	0	0
Oculina diffusa	6	5	4	4	3	0	1	1	1	1	2	0	0
Oculina robusta	0	0	0	0	0	1	0	0	0	0	0	0	0
Phyllangia americana	0	0	0	0	1	0	0	1	0	2	2	2	0
Porites astreoides	8	22	32	39	115	170	258	273	299	339	161	165	129
Pseudodiploria clivosa	20	21	24	23	23	0	0	1	0	0	0	0	0
Pseudodiploria strigosa	1	0	0	1	1	0	1	0	1	0	0	0	0
Siderastrea radians	9	0	7	0	0	0	0	1	0	0	0	2	8
Siderastrea siderea	79	77	44	41	65	83	83	131	171	176	97	75	60
Solenastrea bournoni	1	1	1	1	1	1	1	0	0	1	0	0	0
Stephanocoenia intersepta	1	0	0	0	0	0	0	0	0	0	0	0	0
Tubastraea coccinea	0	0	0	0	0	0	0	0	0	2	0	0	0

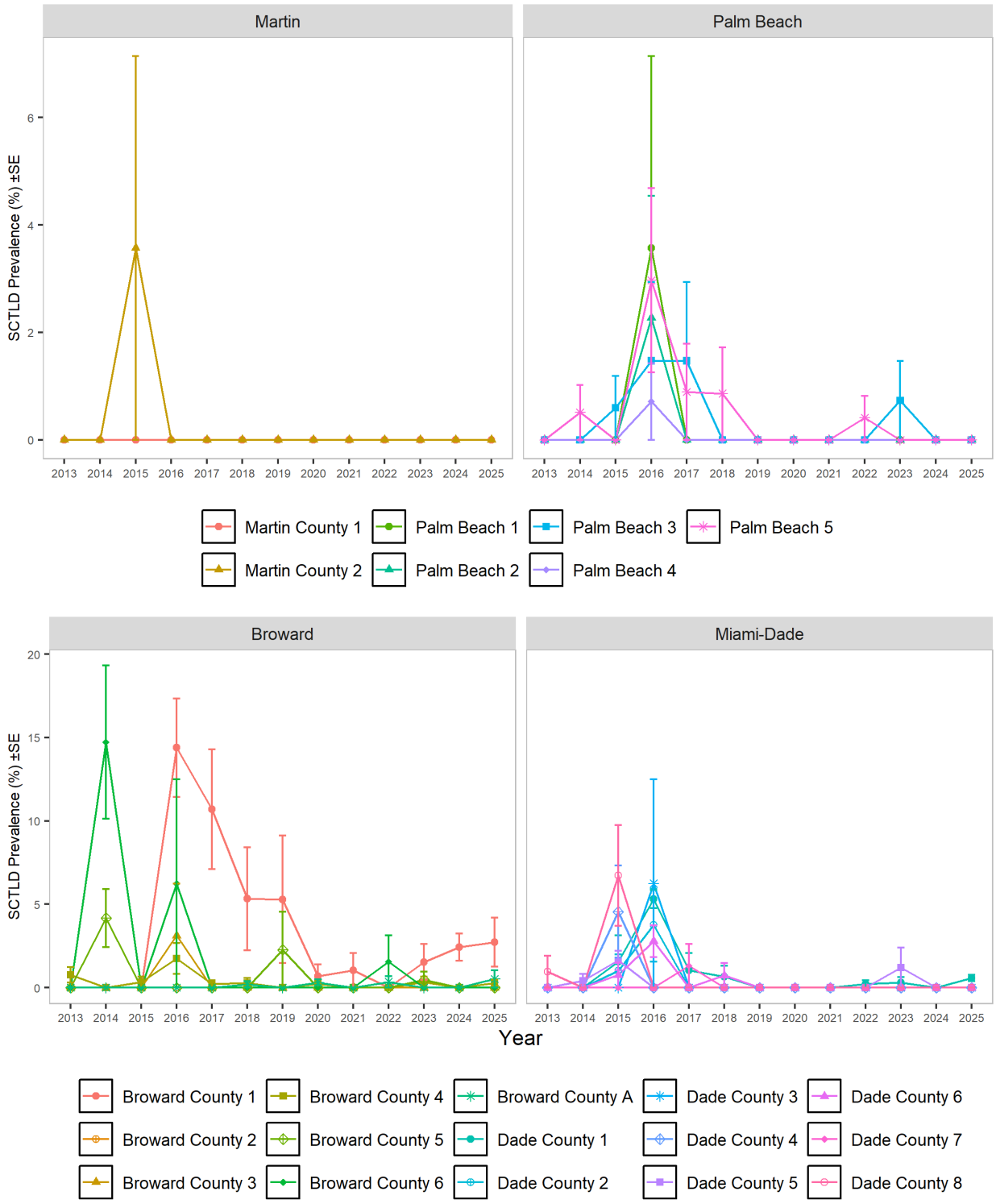

Figure 2. Stony coral tissue loss disease (SCTLD) mean (± SE) prevalence (%) from 2013-2025 per 22 m^2 transect grouped by county. Broward County A survey does not include *Acropora cervicornis* colonies.

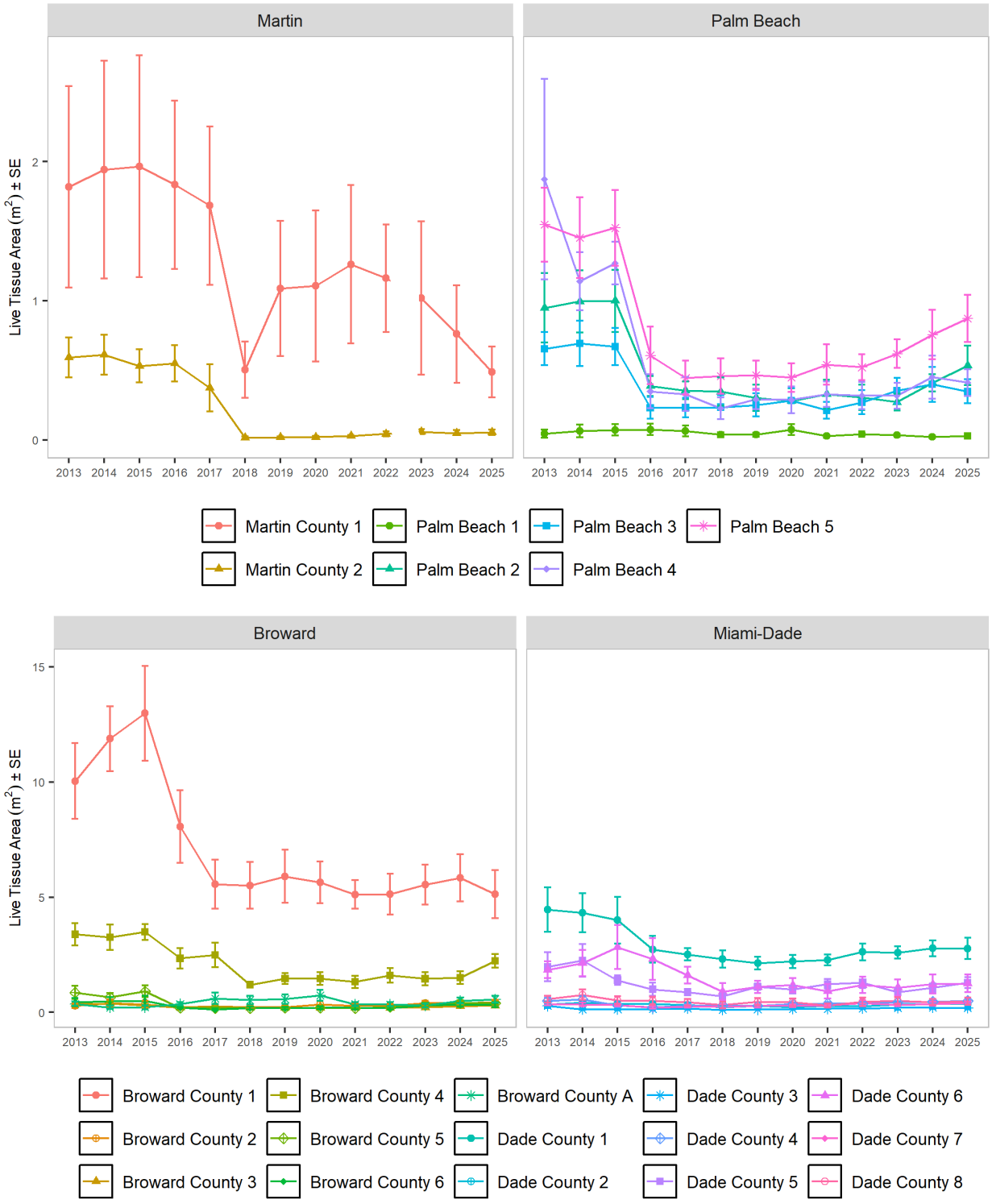

Figure 3. Mean (± SE) site LTA (m^2) from 2013-2025 per 22 m^2 transect grouped by county. Broward County A does not include *Acropora cervicornis*. The data points between 2022 and 2023 for Martin County sites are not connected because Martin County LTA measurements for 2023 are based on only 10 m^2 of transect survey area, compared to the 22 m^2 used in all previous years, and thus measurements are not directly comparable.

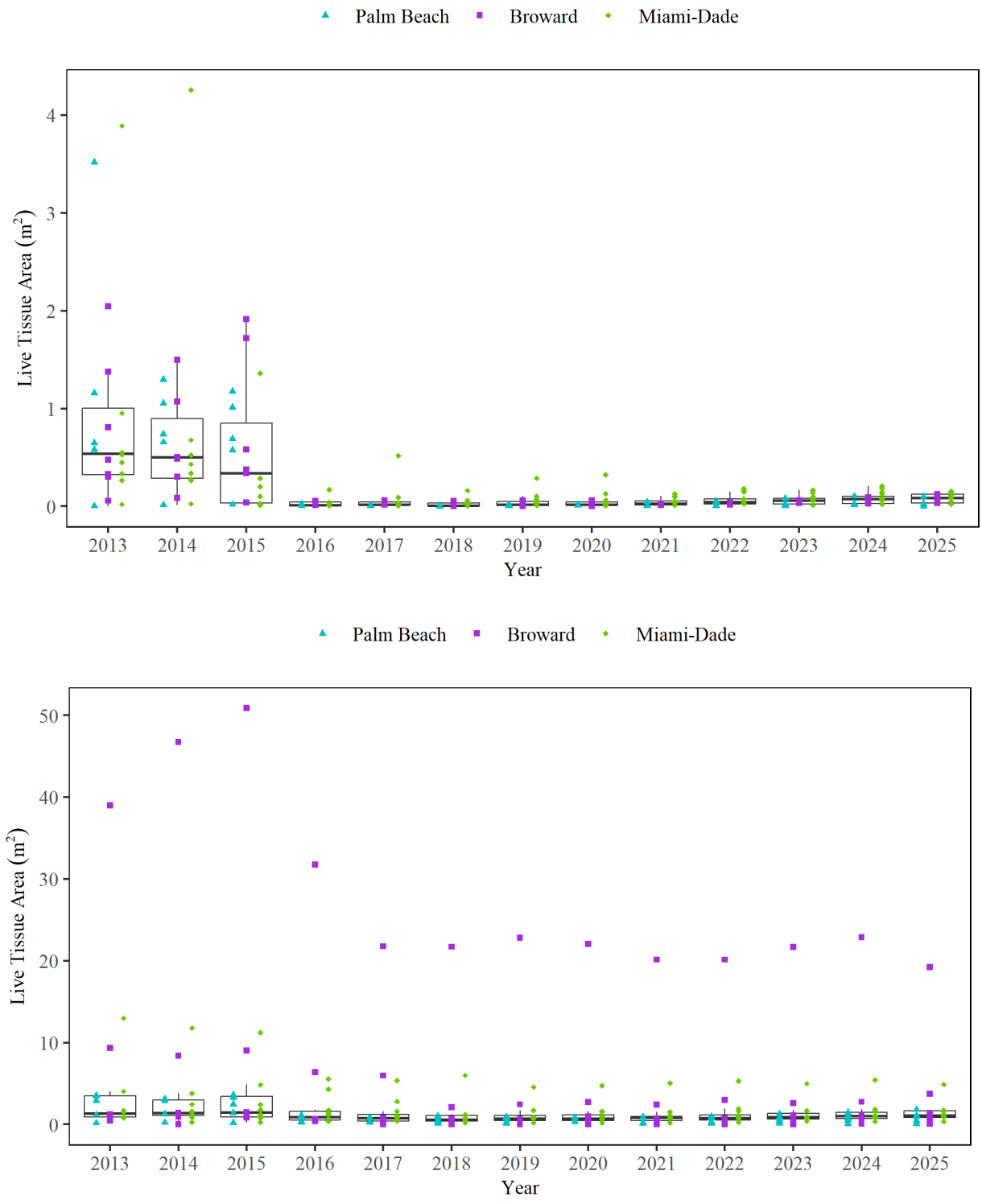

Figure 4. Mean (± SE) LTA (m^2) for Highly Susceptible species (top) and Intermediately Susceptible species (bottom) in Palm Beach, Broward, and Miami-Dade Counties. Each point is the LTA at a site, colored by county. The middle bar in the boxplot is the median LTA for these locations, the areas below and above the median, hinges, represent the 1st and 3rd quartiles, respectively. The whiskers, upper and lower, extend from the hinge to the largest value no greater than 1.5*IQR, where IQR is the inter-quartile range (distance between 1st and 3rd quartiles). Points lying beyond the whiskers are considered outliers. Values for Martin County can be found in Table 4.

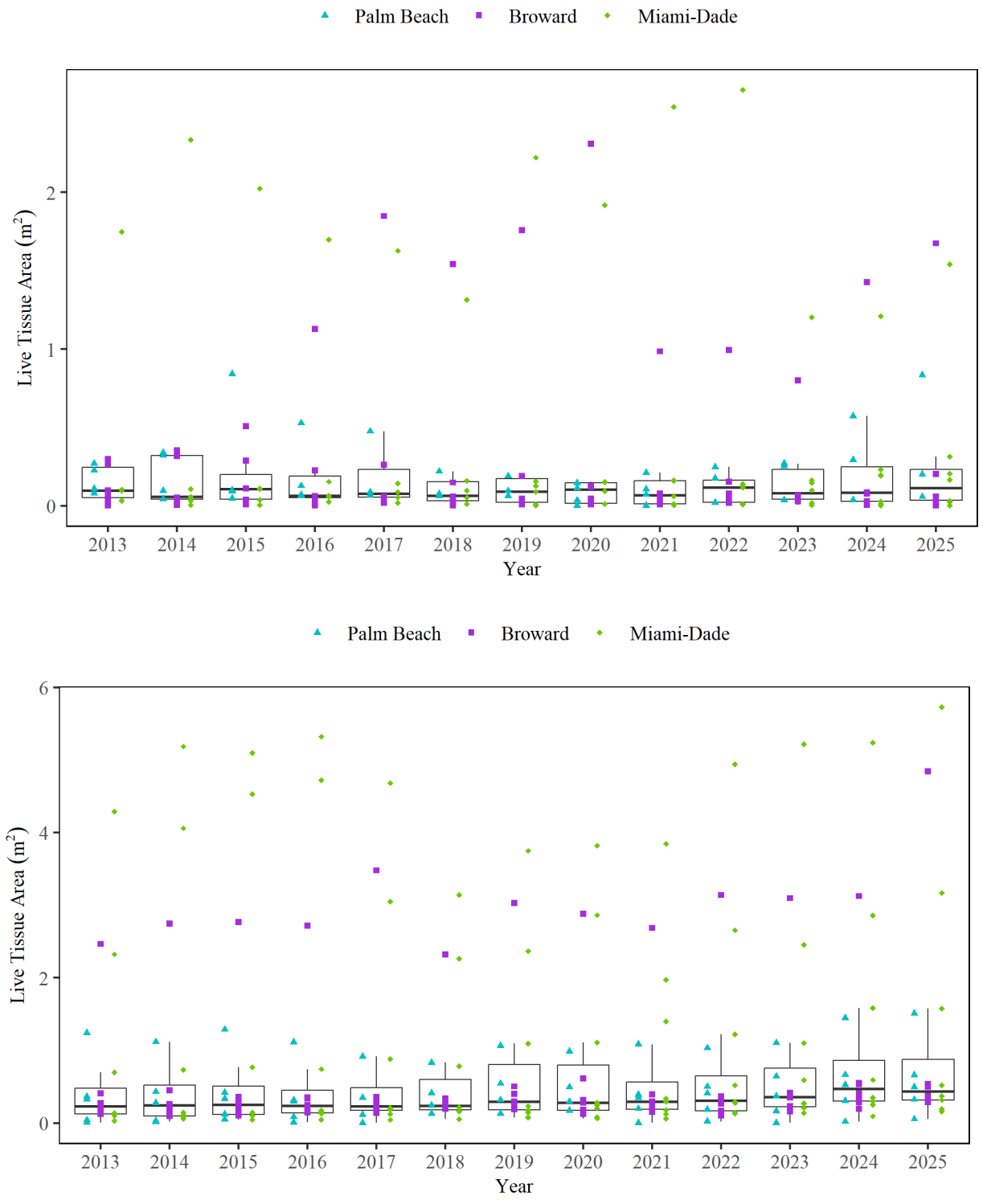

Figure 5. Mean (± SE) LTA (m^2) for Presumed Susceptible species and Lowly Susceptible species, respectively, in Palm Beach, Broward, and Miami-Dade Counties. See Figure 4 for boxplot explanation. Values for Martin County can be found in Table 4.

Table 4. Mean site LTA (m^2) for the two Martin County sites (MC1 and MC2) from 2013-2025 for each SCTLD Susceptibility group. Note that in 2023 the stony coral transect survey length was reduced from 22 meters to 10 meters.

Susceptibility	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Highly	4.39	4.71	4.49	4.17	3.31	0.00	0.001	0.002	0.006	0.00	0.00	0.00	0.00
Intermediately	0.22	0.20	0.18	0.15	0.17	0.13	0.14	0.17	0.22	0.28	0.14	0.27	0.22
Presumed	0.01	0.008	0.02	0.02	0.03	0.003	0.00	0.004	0.009	0.005	0.00	0.00	0.00
Lowly	0.19	0.19	0.28	0.42	0.60	0.91	2.07	2.07	2.35	2.09	0.83	1.33	0.83

- Species defined as Highly Susceptible to SCTLD (including, but not limited to, *Colpophyllia natans, Pseudodiploria strigosa, Pseudodiploria clivosa,* and *Meandrina meandrites*) saw significant declines in LTA beginning in 2016 (Figure 4 and Table 4). LTA in 2016-2025 was significantly lower than LTA in 2013 and 2014. These significant declines were recorded across all four counties, and all sites have <0.2 m^2 of these species remaining, with a total <1.5 m^2 (Figure 4 and Table 4).

- Species defined as Intermediately Susceptible to SCTLD (including, but not limited to, *Montastraea cavernosa* and *Orbicella* spp. complex) also saw significant declines in LTA. Regional LTA in 2018-2025 was significantly lower than in 2014 and 2015 (Figure 4). Despite losses, *Montastraea cavernosa* has historically been and continues to be the greatest contributor to LTA in the SECREMP region. Martin County did not experience significant declines in intermediately susceptible species over the study period (Table 4); this is likely because of the historically low abundance of *M. cavernosa* there, and the more recent increases in *S. siderea*, which is also classified as intermediately susceptible.

- Species classified as Presumed Susceptible to SCTLD did not have any significant changes in regional LTA over the study period. These species include *A. agaricites* complex, *Agaricia lamarcki*, and *Mycetophyllia* spp. However, as many of these species do not contribute a large amount of LTA, changes in these species' LTA are less likely to be captured.

- Although species classified as Lowly Susceptible (including *P. porites* and *P. astreoides*) did not significantly change in regional LTA, there is a noticeable increasing trend. *Porites astreoides* has more than doubled in abundance from 2013 to 2025 and *P. porites* has increased by almost eight-fold across the region (Table 2).

- There has been a significant increase in density in 2024 and 2025 compared to all years 2013-2019 (Table 1). This increase in density is driven by small, non-reef building colonies that have not led to significantly increased regional LTA.

- In addition, increases in density are driven predominantly by species not susceptible to SCTLD (Table 1). Those species susceptible to SCTLD have not yet seen any significant recovery post-disease event (Figure 4).

- Beginning in 2018, stony coral colonies <4 cm in diameter were identified to lowest taxonomic level possible and tallied across all SECREMP sites. In 2025, 2818 colonies <4 cm were found in Palm Beach, Broward, and Miami-Dade Counties (Table 5). 524 colonies <4 cm were found in Martin County (Table 6).

- The three most abundant species in 2025 (colonies <4 cm diameter) in Palm Beach, Broward, and Miami-Dade Counties were *Siderastrea* spp. (1546 colonies), *P. astreoides* (482 colonies), and *M. cavernosa* (278 colonies), which made up 79% of all colonies <4 cm recorded at these locations (Table 5). In Martin County in 2025, *Siderastrea* spp. (398 colonies) and *P. astreoides* (124 colonies) colonies dominated colonies <4 cm abundance, comprising more than 99% of all colonies <4 cm recorded there (Table 6).

- Of the 15 species defined as Highly or Intermediately susceptible to SCTLD, eight species/genera had fewer than 10 colonies <4 cm recorded across all sites in 2025 (Table 5). All of those that were documented were found across Palm Beach, Broward, and Miami-Dade Counties.

Table 5. Species abundance of stony coral colonies <4 cm from 2018-2025 across Palm Beach, Broward, and Miami-Dade Counties. Region is the total stony coral abundance of colonies <4 cm across all species by year at these locations. Each colony was identified to the lowest taxonomic level possible. See Table 6 for stony coral <4 cm abundance in Martin County.

Species	2018	2019	2020	2021	2022	2023	2024	2025
Region	1542	1504	2128	1895	2284	2235	2818	2933
Acropora cervicornis	0	0	0	1	0	0	0	1
Agaricia agaricites complex	162	325	375	190	263	210	147	204
Cladocora arbuscula	0	0	0	0	0	0	2	1
Colpophyllia natans	1	0	1	1	2	0	1	1
Dichocoenia stokesii	33	21	27	24	23	11	8	9
Diploria labyrinthiformis	0	1	2	0	0	0	3	0
Eusmilia fastigiata	3	3	1	7	3	2	3	8
Helioseris cucullata	0	0	0	2	0	0	0	0
Madracis auretenra	16	5	3	3	2	4	12	8
Madracis decactis	7	6	5	10	6	8	7	6
Meandrina meandrites	14	12	8	9	5	3	0	3
Montastraea cavernosa	158	170	191	210	200	215	260	278
Mycetophyllia spp.	3	5	7	8	2	3	4	2
Orbicella annularis complex	0	0	0	0	1	1	1	1
Phyllangia americana	4	0	0	0	0	3	1	0
Porites astreoides	202	194	257	319	282	316	379	482
Porites porites	52	87	129	113	163	166	218	226
Pseudodiploria spp.	7	3	5	5	4	4	4	2
Scleractinia spp.	1	0	0	1	0	0	0	0
Scolymia cubensis	1	8	5	5	8	9	20	19
Siderastrea spp.	755	569	999	877	1197	1171	1624	1546
Solenastrea bournoni	1	1	3	3	3	5	3	3
Stephanocoenia intersepta	122	94	110	106	120	104	121	134

Table 6. Species abundance of stony coral colonies <4 cm from 2018-2025 in Martin County. Region is the total stony coral abundance of colonies <4 cm across both Martin County sites. Note that beginning in 2023 the stony coral transect survey length was reduced from 22 meters to 10 meters; thus, these numbers likely underestimate the abundance of corals that are common at those sites, notably *Siderastrea siderea* and *Porites astreoides*.

Species	2018	2019	2020	2021	2022	2023	2024	2025
Region	530	358	1090	1243	1008	978	577	524
Isophyllia sinuosa	0	0	0	0	3	0	0	1
Montastraea cavernosa	0	0	1	0	1	0	0	0
Mussa angulosa	0	0	0	1	0	0	0	0
Oculina diffusa	0	1	1	1	1	0	0	0
Phyllangia americana	8	2	1	3	2	0	0	1
Porites astreoides	107	38	159	235	351	224	138	124
Pseudodiploria spp.	0	1	1	0	0	0	0	0
Scolymia cubensis	0	0	0	0	0	1	0	0
Siderastrea spp.	415	316	927	1003	647	752	439	398
Tubastraea coccinea	0	0	0	0	3	1	0	0

Octocoral and Xestospongia muta *Density*

- Region-wide octocoral density (colonies/m²) from 2015-2017 was significantly greater than in 2013 and 2014. However, in 2018 density declined, driven by loss from Hurricane Irma. Octocoral density has since recovered, and density in 2025 was significantly greater than in 2020 and 2021 (Figure 6). Although not statistically significant, regional octocoral density in 2023 is greater than during post-hurricane recovery in 2018. Octocoral target species information is available in the 2024 comprehensive report (Leinbach et al. 2025).

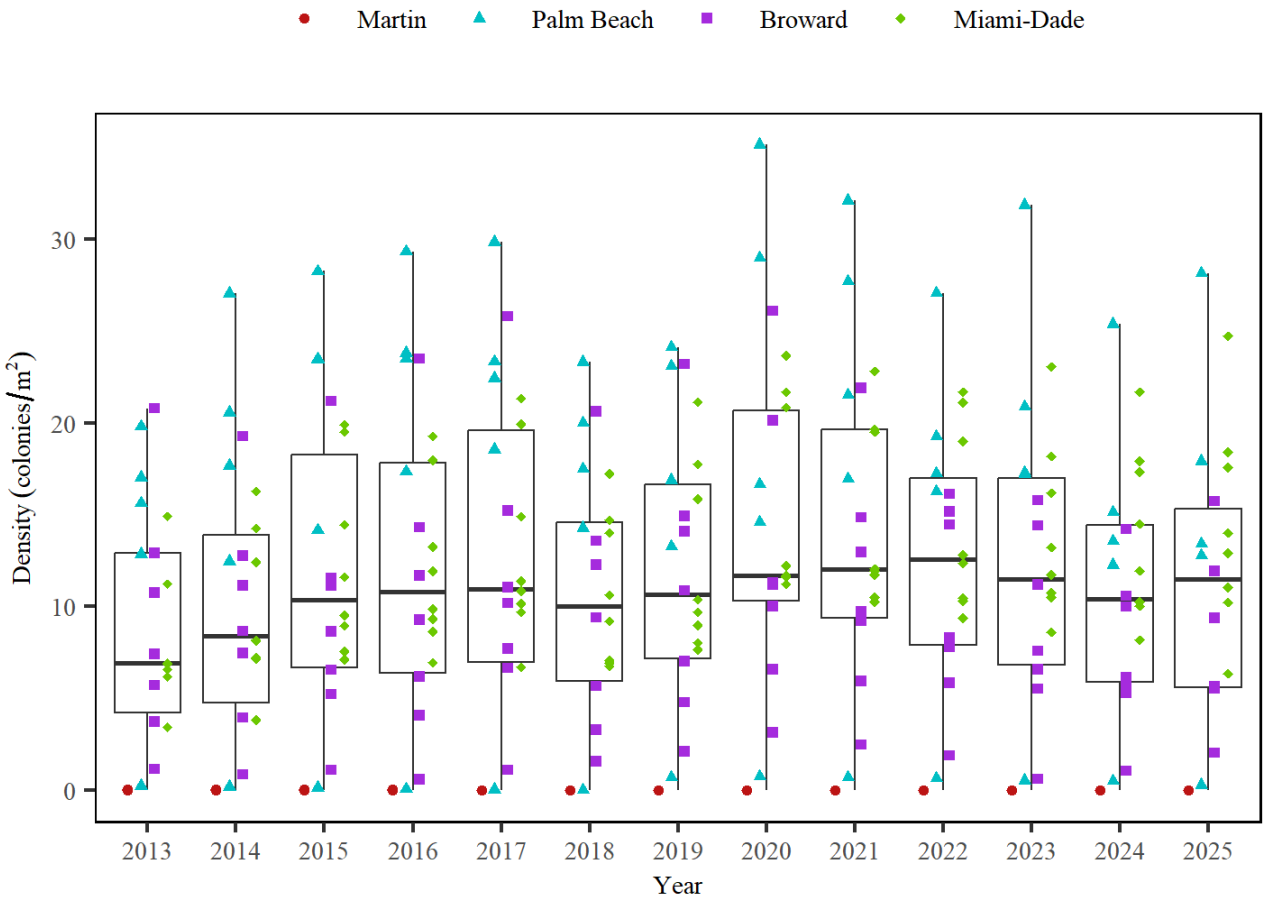

Figure 6. Octocoral density (colonies/m²) across all sites from 2013-2025. See 4 for boxplot explanation.

- Region-wide (all sites pooled) *X. muta* density was significantly greater in 2016 and 2017 than it was in 2013. However, as observed with octocorals, in 2018 density declined, driven by loss from Hurricane Irma in 2017. Density in 2019-2025 was significantly greater than density in 2013, showing recovery post-disturbance (Figure 7).

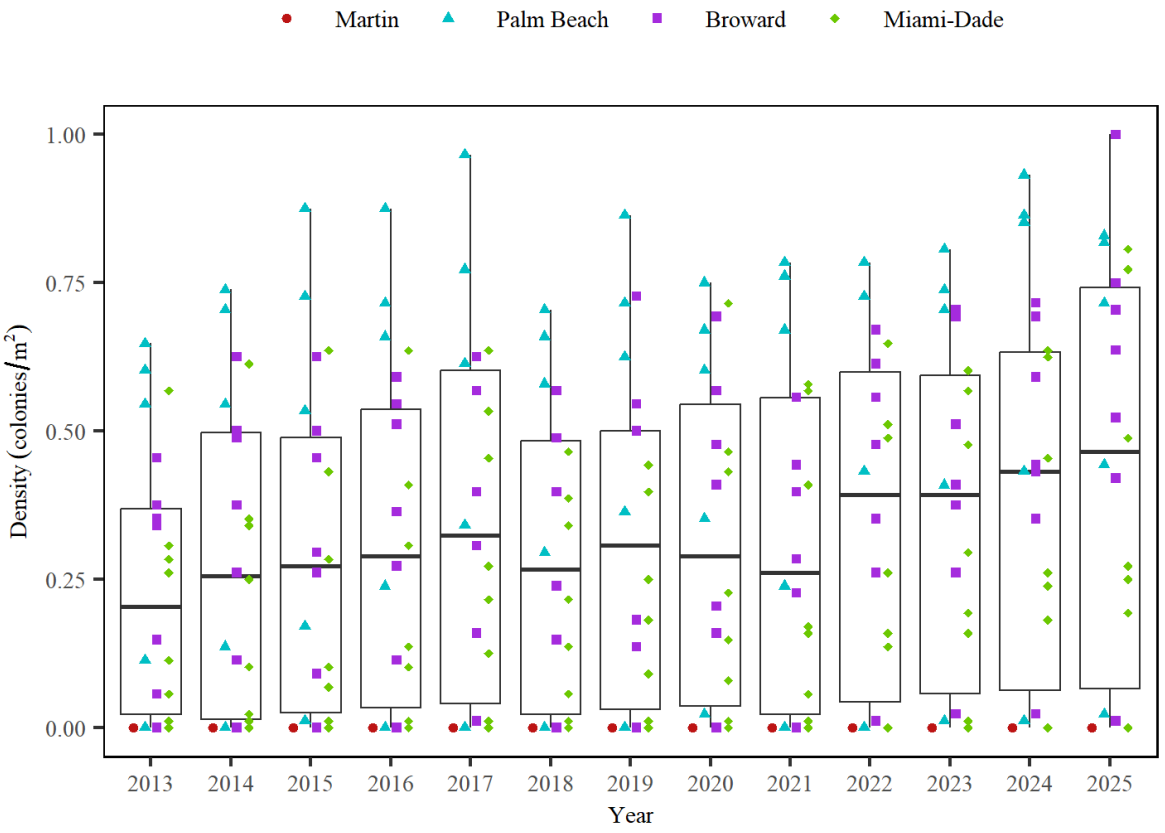

Figure 7. *Xestospongia muta* density (colonies/m^2) across all sites from 2013-2025. See Figure 4 for boxplot explanation.

Functional Group Benthic Cover

- Long-term trends in benthic functional group (stony coral, octocoral, sponges, and macroalgae) cover are not presented in this Executive Summary. Long-term trend analysis (2003-2024) was presented in the 2024 comprehensive report (Leinbach et al. 2025).

- In 2025, stony coral percent cover averaged across all SECREMP sites was 1.14% (Figure 8). Region-wide stony coral cover did not significantly change from 2024 to 2025 but did decrease slightly from 1.08% in 2024. Stony coral cover did not significantly change at any individual sites between 2024 and 2025. Cover at BCA increased non-significantly from 0.68% in 2024 to 0.91% in 2025. Stony coral cover was fairly consistent over time from 2024 to 2025 (Table 7).

- Region-wide octocoral cover increased non-significantly from 2024 to 2025 from 9.55% to 10.53% (Figure 8). Three sites experienced significant increases in octocoral cover (BC6, DC4, and DC8), and fifteen sites, across Palm Beach, Broward, and Miami-Dade counties, saw non-significant increases. No sites experienced significant octocoral cover decreases, although five sites experienced non-significant decreases. Martin County sites were not included in this analysis because octocorals are generally not present there. All eight sites in Miami-Dade County increased in octocoral coverage, but only two (DC4 and DC9) did so significantly.

- The largest increase in octocoral cover, at DC4, was from 10.96% in 2024 to 16.42% in 2025. The largest decrease in octocoral cover occurred at BC2, from 7.07% in 2024 to 6.05% in 2025, although this was not statistically significant. Other sites with declines in octocoral cover had similar changes in magnitude (Table 7).

- Changes in macroalgae cover were highly variable which is typical for this taxon and reflects the ephemeral nature of macroalgae. Region-wide macroalgae cover significantly increased from 19.78% in 2024 to 22.05% in 2025. Thirteen sites (PB1, PB2, PB3, PB4, PB5, BC1, BC3, BCA, DC1, DC2, DC4, DC6, DC8) significantly increased in macroalgae cover, while five sites (BC2, BC4, BC5, DC3, DC7) significantly decreased. Sites that significantly increased or decreased are spread throughout the SECREMP region; however, it is notable that all five sites in Palm Beach County experienced increases. The largest increase in macroalgae cover occurred at DC4, where cover increased from 6.05% in 2024 to 27.79% in 2025 and the largest decrease in octocoral cover occurred at BC4, where cover decreased from 48.90% in 2024 to 20.38% in 2025. In general, decreases in macroalgae cover were greater in magnitude than increases in macroalgae cover, but many more sites experienced increases rather than decreases (Table 7).

- Region-wide sponge cover did not significantly change, with values of 5.66% in 2024 and 5.49% in 2025 (Figure 8). One site (BC4) significantly increased in sponge cover. This site had the sixth lowest sponge coverage of all sites in 2024, at 2.62%. Cover increased at BC4 to 3.91% in 2025, the ninth lowest value during this survey year. Two sites significantly decreased in sponge cover, both in Palm Beach County (PB2 and PB4). The largest decrease in sponge cover occurred at PB4 where cover decreased from 14.44% in 2024, the highest sponge cover of Palm Beach County sites, to 11.74% in 2025, the second highest value for Palm Beach County. Sponge cover across the region was relatively constant from 2024 to 2025, with nineteen sites experiencing no significant changes (Table 7).

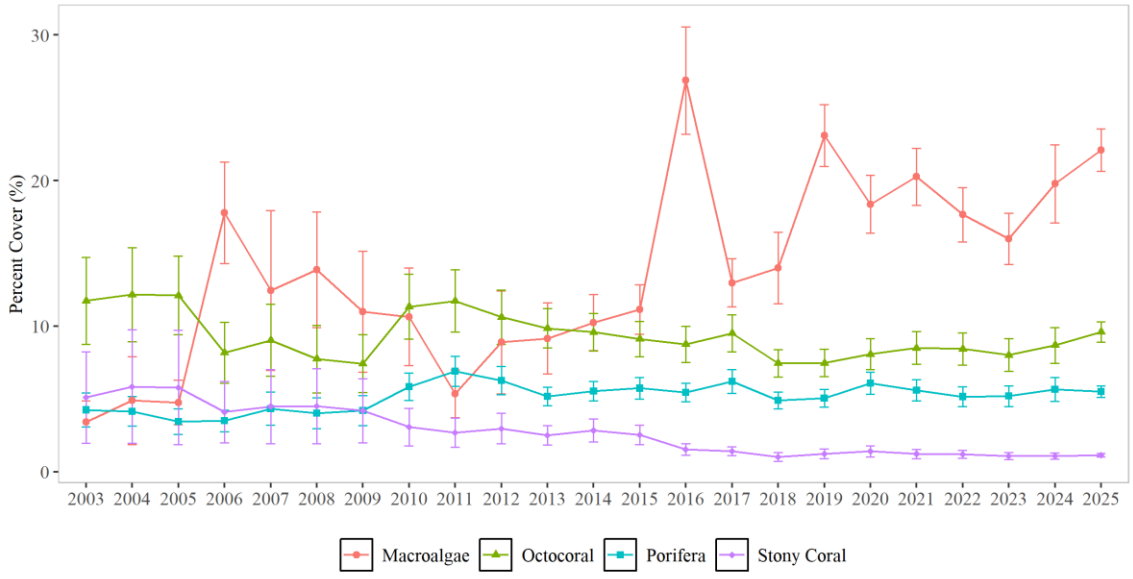

Figure 8. Mean (± SE) region-wide annual percent cover of stony coral, octocoral, sponge, and macroalgae (values for each year include all sites sampled that year).

Table 7. Mean (± SE) 2025 percent (%) benthic cover of stony coral, octocoral, sponge, and macroalgae. Bolded 2025 cover values with '+' are significantly greater than 2024 and bolded cover values with '-' are significantly lower than 2024.

Site	Stony Coral	Octocoral	Sponge	Macroalgae
MC1	0.91 ± 0.29	0.00 ± 0.00	0.97 ± 0.44	26.02 ± 1.49
MC2	0.14 ± 0.14	0.00 ± 0.00	1.31 ± 0.59	46.13 ± 8.05
PB1	0.15 ± 0.12	0.09 ± 0.09	4.30 ± 1.68	**+21.53 ± 5.52**
PB2	1.08 ± 0.34	18.04 ± 2.82	**-5.78 ± 0.69**	**+9.90 ± 2.74**
PB3	0.92 ± 0.27	20.52 ± 2.03	12.44 ± 1.21	**+13.15 ± 0.35**
PB4	0.58 ± 0.17	17.48 ± 3.11	**-11.74 ± 0.35**	**+14.85 ± 4.44**
PB5	1.20 ± 0.31	15.21 ± 1.57	9.58 ± 1.44	**+15.44 ± 2.89**
BC1	4.44 ± 1.15	6.35 ± 1.23	3.01 ± 0.40	**+35.11 ± 5.05**
BC2	0.62 ± 0.24	6.05 ± 0.28	5.84 ± 0.49	**-8.51 ± 2.64**
BC3	0.50 ± 0.13	10.42 ± 0.99	6.41 ± 0.52	**+20.42 ± 5.69**
BC4	2.92 ± 0.57	4.20 ± 1.12	**+3.91 ± 0.76**	**-20.38 ± 4.94**
BC5	0.79 ± 0.07	7.27 ± 1.04	9.36 ± 2.03	**-7.06 ± 1.01**
BC6	0.77 ± 0.15	**+11.58 ± 1.00**	8.18 ± 1.17	11.71 ± 3.83
BCA	0.91 ± 0.13	0.63 ± 0.13	1.13 ± 0.09	**+18.06 ± 4.44**
DC1	2.39 ± 0.31	7.60 ± 0.68	3.05 ± 0.48	**+28.89 ± 5.02**
DC2	0.99 ± 0.21	11.06 ± 1.46	6.11 ± 0.83	**+22.05 ± 5.55**
DC3	0.38 ± 0.09	13.40 ± 0.72	4.95 ± 0.74	**-14.01 ± 5.56**
DC4	1.17 ± 0.54	**+16.42 ± 1.54**	7.99 ± 0.32	**+27.79 ± 6.70**
DC5	1.40 ± 0.42	14.72 ± 2.41	3.33 ± 0.84	21.94 ± 3.69
DC6	1.45 ± 0.47	8.71 ± 0.55	1.62 ± 0.18	**+41.58 ± 7.94**
DC7	0.21 ± 0.06	8.09 ± 0.55	6.25 ± 1.03	**-24.91 ± 8.04**
DC8	1.09 ± 0.28	**+12.84 ± 1.77**	3.49 ± 0.50	**+35.74 ± 5.92**

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