

VI. Anemone and corallimorpharian density

Background

Although there is considerable interest in the condition of tropical coral reefs, most historical and recent studies in the Caribbean, including the Florida Keys, have generally focused on either stony corals or fishes. This is not surprising, given that corals are the primary framework elements of many communities, while fishes, together with certain shellfish species (e.g. queen conch and spiny lobster) are generally the principal and most economically important targets of recreational and commercial fishers. In the Florida Keys, however, commercial marine-life fisheries and aquarium hobbyists remove an incredible diversity of invertebrates and fishes (Bohnsack et al. 1994). Available commercial landings data for the marine ornamental fishery (aquarium fishery) include both state and federal waters from West Palm Beach to Key West, organized by 16 areas (FWCC 2001). Key Largo has been protected from marine aquarium trade species collection since 1960 in John Pennekamp Coral Reef State Park, followed by the protection in federal waters within the Key Largo National Marine Sanctuary established in 1975. The Looe Key area has been protected since 1981, and area closures exist in Everglades National Park, the Dry Tortugas, Biscayne National Park, and Fish and Wildlife Service management areas. Four major biological categories are targeted: fishes (39 nominal groups), invertebrates (18 nominal groups), plants, and sand and live rock. State and Federal waters near Key West and Marathon in the Florida Keys constitute 94% of the total fishes and invertebrates removed in southeast Florida for the marine aquarium trade. Commercial data do not include an undocumented effort from recreational fishers, nor are data available concerning species abundance patterns and population trends relative to fishing effort (NOAA 1996).

There is a paucity of basic ecological information for most Florida Keys anemone and corallimorpharian (Cnidaria, Anthozoa) species, and even fewer studies have explored the population effects of exploitation. During 2008, we continued to add to a spatial and temporal framework for describing the habitat distribution and abundance patterns of selected actinians (O. Actiniaria) and corallimorpharians (O. Corallimorpharia) in the Florida Keys in relation to habitat, regional, and management factors. With the exception of general Caribbean field guides (e.g. Sefton and Webster 1986; Kaplan 1988; Humann 1992) and isolated distribution studies (Voss and Voss 1955; Wheaton and Jaap 1988; reviewed in Levy et al. 1996), there are no density estimates we are aware of that consider multiple sites and benthic habitat types in the Florida Keys. Many of these species, most notably certain anemones, form associations with several invertebrates such as cleaner shrimps (Limbaugh et al. 1961; Shick 1991) and provide refuge for smaller reef fishes (Hanlon and Kaufman 1976; Colin and Heiser 1973). Some of these associations, such as cleaning stations, provide a valuable function to reef fishes (Herrnkind et al. 1976; Sluka et al. 1999) and the large-scale removal of certain species may have important, but as of yet, undocumented effects on

other biota. The establishment of the Florida Keys National Marine Sanctuary (FKNMS) in 1990 and the subsequent designation of 23 no-fishing zones in 1997 provide an opportunity to evaluate the effects of exploitation for a variety of species, including those targeted by the marine aquarium fishery (Bohnsack 1997). These data provide a means from which to measure the responses of organisms to protection from exploitation.

Quantitative surveys for the 2008 surveys targeted anemones (O. Actiniaria) and corallimorpharians (O. Corallimorpharia) known or suspected to occur in the Florida Keys, and focused on the larger and conspicuous or field-identifiable members of both orders. Similar surveys were carried out in the study area during 1999-2001 and 2005, as well as in the Tortugas region during 2000, 2006, and 2008. Six anemone species were recorded (classification according to Cairns et al. 1991), all of which tend to have solitary and larger polyps compared to other cnidarians: the giant Caribbean or pink-tipped anemone *Condylactis gigantea* in the Family Actiniidae, the ringed or corkscrew anemone *Bartholomea annulata* in the Family Aiptasiidae, the speckled anemone *Epicystes* (= *Phymanthus*) *crucifera* in the Family Phymanthidae, the sun anemone *Stichodactyla* (= *Stoichactis*) *helianthus* in the Family Stichodactylidae, *Heteractis lucida*, and *Lebrunia danae*. Three corallimorpharians were found: *Discosoma* (= *Paradiscosoma*) *carlgreni* and *D.* (= *Rhodactis*) *sanctithomae* in the Family Actinodiscidae and *Ricordea florida* in the Family Corallimorpharidae. Corallimorpharians, sometimes called false corals, differ from anemones in the arrangement of the tentacles, and may be solitary, but are typically found in clusters.

2008 Survey Results

Six anemone species were recorded from the 145 survey sites in 2008 (Figure 59) and a total of 530 individuals were enumerated from surveys of 8,700 m² of benthic habitat. Tables 14-16 provide site-level densities for the six species. The anemones found were represented by: *Bartholomea annulata* (306 individuals, 57.7% of the total), *Condylactis gigantea* (21 individuals, 4.0%), *Epicystes crucifera* (35 individuals, 6.6%), *Heteractis lucida* (4 individuals, 0.8%), *Lebrunia danae* (155 individuals, 29.3%), and *Stichodactyla helianthus* (9 individuals 1.7%). The six species exhibited markedly different habitat and regional distribution patterns in the Florida Keys. *B. annulata* was the most abundant and wide-ranging anemone, similar to earlier surveys conducted by our program in 1999-2001. Mean habitat-level densities for this species were relatively similar among the five habitats, ranging from 0.027 ± 0.004 per m² on high-relief spur and groove to 0.048 ± 0.005 per m² on the deeper fore-reef. The greatest site-level density was 0.133 individuals per m² (8 individuals from four 15-m x 1-m transects) recorded from a low-relief spur and groove site on the deeper fore-reef. On mid-channel patch reefs, densities tended to be greater in

the upper and lower Keys, especially in reference sites (Figure 60). No discernible pattern in density among regions or between no-fishing zones and reference areas was apparent for other habitats (Figures 61-63).

Similar to surveys in 1999-2001 and 2005, densities of *Condylactis gigantea* were relatively low in 2008 (Table 14). In contrast to *B. annulata*, most *C. gigantea* were restricted to mid-channel and offshore patch reefs, as well as inner line reef sites. Densities on mid-channel patch reefs were greater in the upper Keys compared to other regions, while densities on offshore patch reefs were greater in the middle Keys. Distribution patterns of *Epicystes crucifera* were similar to *C. gigantea*, but with greater habitat specificity on mid-channel patch reefs, especially in the lower Keys (Table 14). Individuals were particularly abundant (up to 0.32 per m²) in the Western Sambo Ecological Reserve. Only four individuals of the knobby anemone (*Heteractis lucida*) were encountered, all of which were found on mid-channel and offshore patch reefs (Table 15). In contrast, the sun anemone (*Stichodactyla helianthus*) was only found in high-relief spur and groove, specifically at one site (Maryland Shoal) in the lower Keys. *Lebrunia danae*, the second most abundant anemone surveyed during 2008, was most abundant on mid-channel patch reefs and offshore patch reefs. In contrast to some of the other species, *L. danae* exhibited a clear regional pattern in density, with the greatest densities in the lower Keys for four of the five habitats sampled (Table 15).

A total of 2,063 corallimorpharians representing three species were sampled during 2008 (Figure 64): *Discosoma carlgreni* (22 individuals, 1.1%), *D. sanctithomae* (459 individuals, 22.3%), and *Ricordea florida* (1,582 individuals, 76.7%). Table 16 provides site-level densities for the three corallimorpharians and Figures 65-68 illustrate variations in abundance by region and management zone for *R. florida* in four of the five habitats. Of the 22 *D. carlgreni* encountered, all were found on mid-channel patch reefs, and 77% were found in the lower Keys. Patch reef sites within the Western Sambo Ecological Reserve yielded the highest site-level densities recorded during 2008. Similar to its congener, *D. sanctithomae* was most abundant on mid-channel patch reefs, especially in the lower Keys region, and only a few individuals were found on offshore patch reefs and the deeper fore-reef, but these were limited as well to the lower Keys (Table 16). Site-level densities were as high as 3.4 individuals per m².

The most abundant corallimorpharian surveyed during 2008 was *Ricordea florida*. Like *D. sanctithomae*, the greatest densities of *R. florida* were found on mid-channel and offshore patch reefs, especially in the lower Keys (Figures 65-66), while offshore habitats yielded substantially lower densities (Figures 67-68). Site-level densities were as high as 4.6 individuals per m². On the 24 patch reefs sites, the two highest

site-level densities were recorded within the Western Sambo Ecological Reserve (Table 16). A similar pattern was found on offshore patch reefs, where two out of the 23 sites sampled with the greatest densities were within the Looe Key Research Only Area.

Discussion

While numerous studies address the life history characteristics of anemones and corallimorpharians, including feeding behavior (Bursey and Guanciale 1977; Bursey and Harmer 1979; Elliot and Cook 1989), reproduction (Jennison 1981), and associations with other fauna (Limbaugh et al. 1961; Colin and Heiser 1973; Hanlon and Kaufman 1976), quantitative estimates of density in the wider Caribbean are limited. Nine actinian species are common in the Caribbean; of these, seven are planktivores, while the two larger species (*Condylactis gigantea* and *Stichodactyla helianthus*) can eat macroscopic prey such as gastropods and echinoids (Van-Praët 1985). Several field guidebooks provide qualitative descriptions of habitat occurrence, biogeographic distribution, and taxonomic characters (Voss 1976; Kaplan 1988; Humann 1992), but with the exception of one quantitative study of benthic cnidarians at Looe Key, in which *Ricordea florida* was included (Wheaton and Jaap 1988), we are not aware of any quantitative data on densities and habitat distributions of actinians and corallimorpharians in the Florida Keys. Levy et al. (1996) reviewed Florida Keys invertebrate inventories up to 1995 and found only three publications that discussed abundance and habitat distribution (e.g. Voss and Voss 1955; Voss et al. 1969).

Our surveys in the Florida Keys indicated that, with the exception of some corallimorpharians on mid-channel and offshore patch reefs, mean density estimates were low (usually < 1 individual per 100 m²) at the spatial scales investigated and habitat types investigated for the six anemones and three corallimorpharians sampled. Four of the six actinians and two of the three corallimorpharians were extremely rare and/or exhibited very limited habitat distributions. The three more commonly encountered species exhibited different density and distribution patterns. *B. annulata* was generally rare but similarly abundant among the habitat strata, while *L. danae* was more common on patch reefs, especially in the lower Keys. The most abundant corallimorpharian, *R. florida*, was significantly more abundant on mid-channel and offshore patch reefs, especially in the lower Keys and particularly within no-take zones.

Conclusions from the 2008 surveys are confined because of poor life history knowledge and the paucity of historical abundance data for anemones and corallimorpharians. Interpretation of density patterns is further complicated because of intensive fishing in the Florida Keys, and the documented spatial patterns may signify under-sampling, habitat utilization, differential exploitation, or perhaps all of these factors. Few significant actinian and corallimorpharian density differences were detected between the no-fishing

zones and reference areas sampled. In general, however, densities for most actinians and corallimorpharians were either similar or lower in no-fishing zones compared to reference sites. The ability to detect density differences between the no-fishing zones and reference areas presumes that: 1) fishing pressure for these organisms is concentrated in the habitat types surveyed, 2) fishing pressure is detectable at the scale of sampling, and 3) fishing pressure is the predominant factor affecting density and distribution. Because spatially explicit fishing effort for the marine aquarium trade is not available, it is difficult to ascertain where organisms are being harvested. We did not sample any soft-sediment communities such as seagrass beds, and it is well known that some of the actinians (e.g. *Bartholomea annulata* and *Condylactis gigantea*) form relatively large aggregations in these habitats. It is possible that overlooked soft-sediment and nearshore hard-bottom habitats contain greater densities of these organisms, perhaps due to differences in wave energy, competition for space, or other unexplored hypotheses. However, certain aspects of cnidarian life history have implications for fisheries management. For example, recruitment of sexually produced planula into natural populations of sea anemones seems rare, and it appears that most anemones studied (see review in Shick 1991) have great longevity of adults, low and sporadic larval recruitment, and high juvenile mortality. Asexual reproduction, especially for corallimorpharians, appears to be very important for maintenance of local aggregations if recruitment is successful (Elliot and Cook 1989), and probably explains the very high, but localized densities or clusters of *Discosoma sanctithomae* and *Ricordea florida*. Without basic information on life history, it will remain difficult to ascertain the ability of these organisms to maintain populations, especially considering the apparent level of exploitation in the Florida Keys (Bohnsack et al. 1994).

Although spatially explicit (e.g. at the scale of individual reefs) landings and fishing effort data are not available for Florida Keys anemones and corallimorpharians, the possibility that the observed density patterns are influenced by fishing should not be dismissed. For example, anecdotal observations, acquired from interviews with Florida Keys residents in 1993, indicated that *Condylactis gigantea* declined by the early 1990s, possibly due to collection, disease, or other causes (DeMaria 1996). Commercial marine life collectors and aquarium hobbyists potentially collect all of the cnidarians surveyed in this study (Bohnsack et al. 1994). Only a saltwater license is needed for recreational fishing, and a saltwater products license and commercial vessel registration is required to fish commercial quantities of unregulated species (NOAA 1996; FWCC 2000). The daily quota for fishes and invertebrates is 20 organisms per person per day, with no more than five angelfishes (Pomacanthidae) and no more than six gorgonian (Octocorallia) colonies, with live landing and live well requirements. In addition to a prohibition on collection in 23 of the no-take zones within the FKNMS, fishing for these “unregulated” species is also prohibited in Biscayne National Park, John Pennekamp Coral Reef State Park/Key Largo

National Marine Sanctuary (since 1960), and the Florida Bay area within Everglades National Park. With a saltwater products license, marine life fishery endorsement, and restricted species endorsement issued by the State of Florida, a limit of 400 *Condylactis gigantea* per vessel per day is currently permitted (FWCC 2000). Recreational regulations allow for a daily quota of 20 individuals of “unregulated” species per day (fished, possessed or landed), but data on recreational landings and effort are not available (NOAA 1996).

Management of exploited species requires essential information on fishing effort, population trends, and life history parameters. Density estimates for anemones and corallimorpharians provide one baseline from which to measure the effects of protection within no-fishing zones. Because density data for shallow-water actinians and corallimorpharians were not available prior to our surveys, these initial samples were a first attempt at exploring spatial variability relative to sampling effort (e.g. number of transects per site, number of sites per stratum). Usage and modification of a stratified random sampling design, in which future optimization is achieved based upon both stratum-specific covariates (e.g. habitat type) and variance estimates (Ault et al. 1999), can provide fishery-independent density and total abundance estimates for cnidarians and other taxa. When coupled with important and much needed information on the marine life fishery, the outputs of this sampling approach can furnish state and federal resource managers with improved guidelines on population estimates and trends relative to fishing intensity. Moreover, the implementation of no-fishing zones in the Florida Keys National Marine Sanctuary presents a unique opportunity to evaluate the effects of fishing (Bohnsack 1997), not only on the most economically important species (Bohnsack et al. 1994), but also on a diversity of targeted, but relatively understudied taxa.

Figure 59. Anemones (Cnidaria, Anthozoa) surveyed for density and habitat distribution in the Florida Keys during 2008.

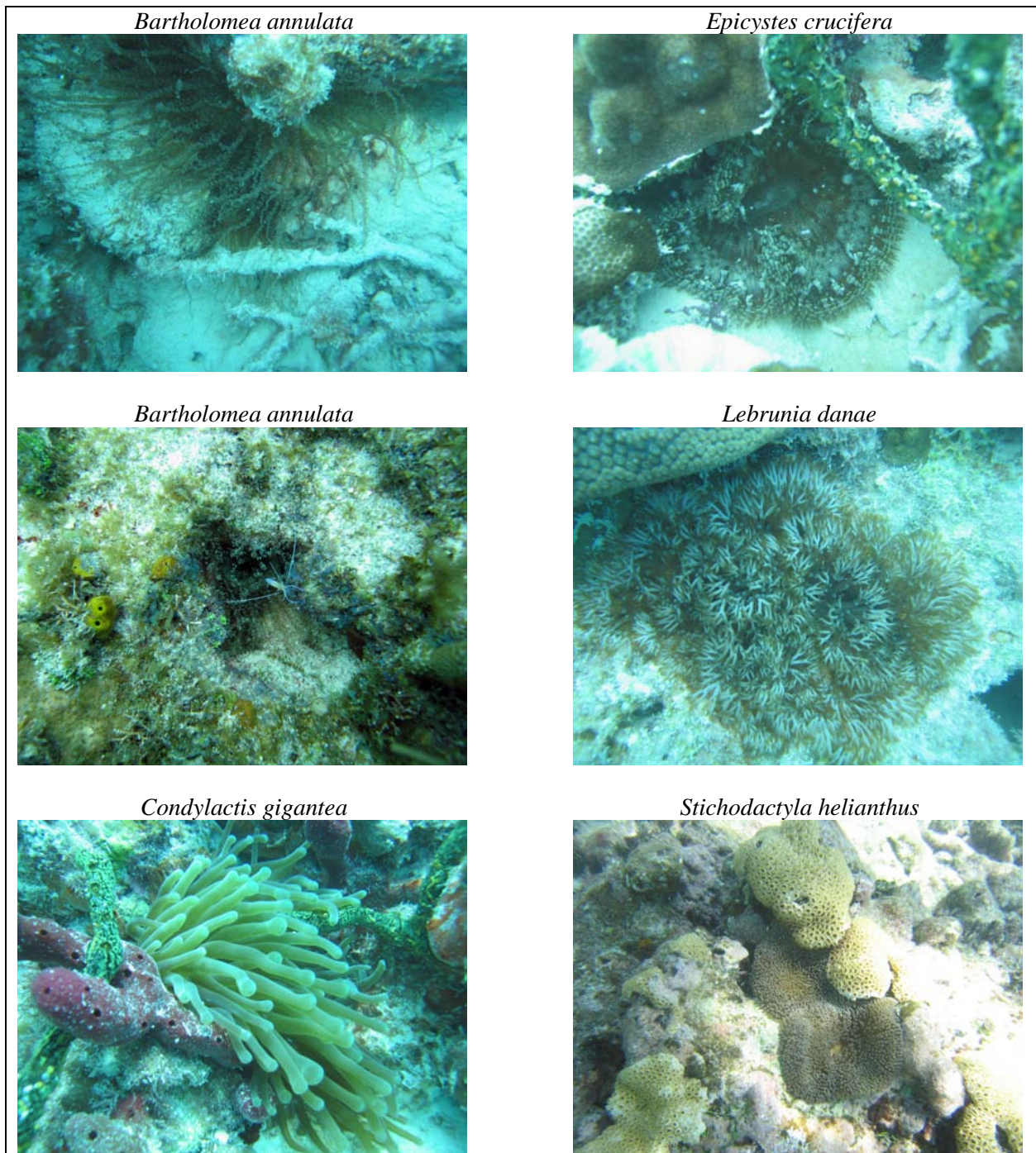


Figure 60. Mean (± 1 SE) densities (no. per m^2) of the corkscrew anemone (*Bartholomea annulata*) on mid-channel patch reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

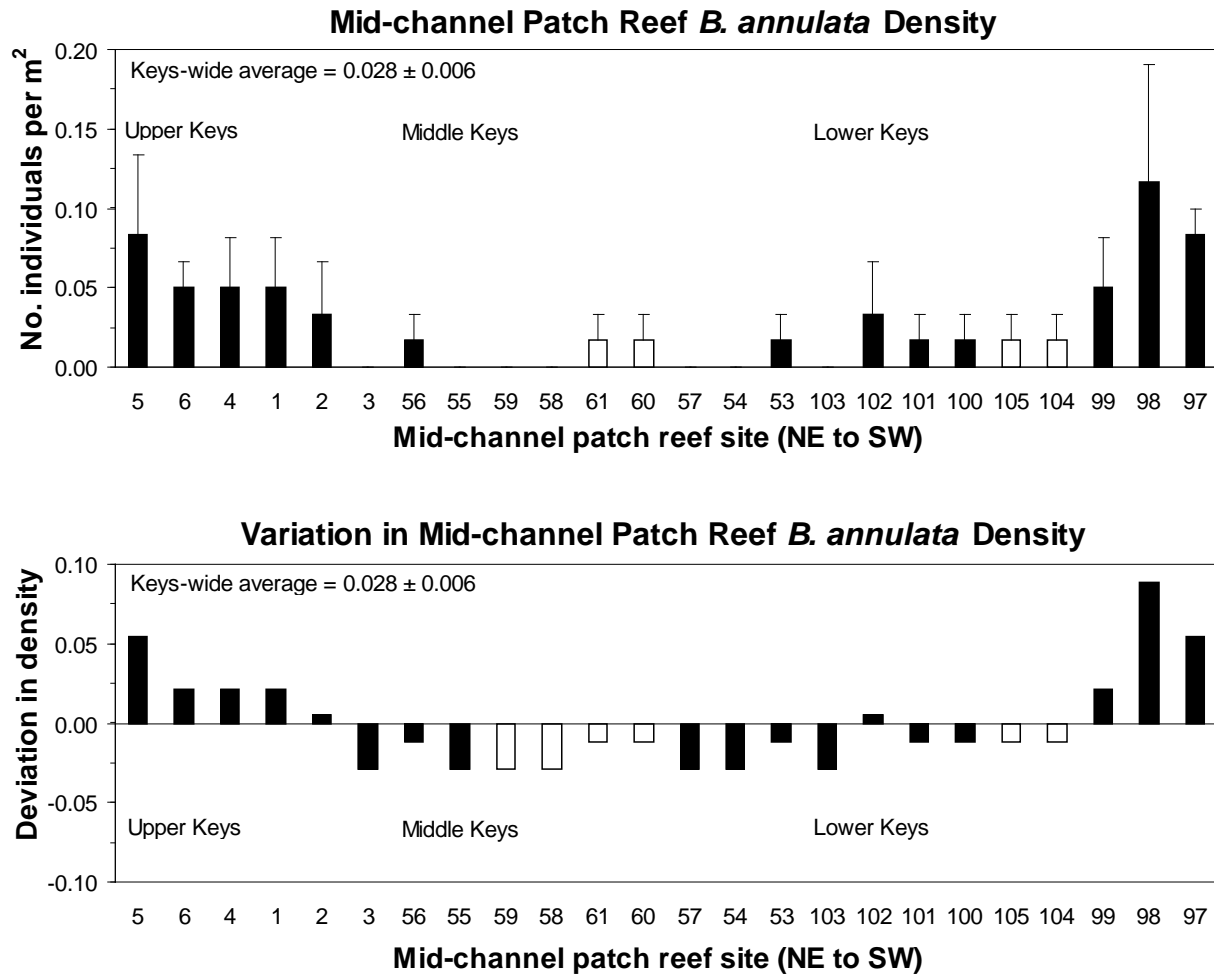


Figure 61. Mean (+ 1 SE) densities (no. per m²) of the corkscrew anemone (*Bartholomea annulata*) on offshore patch reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

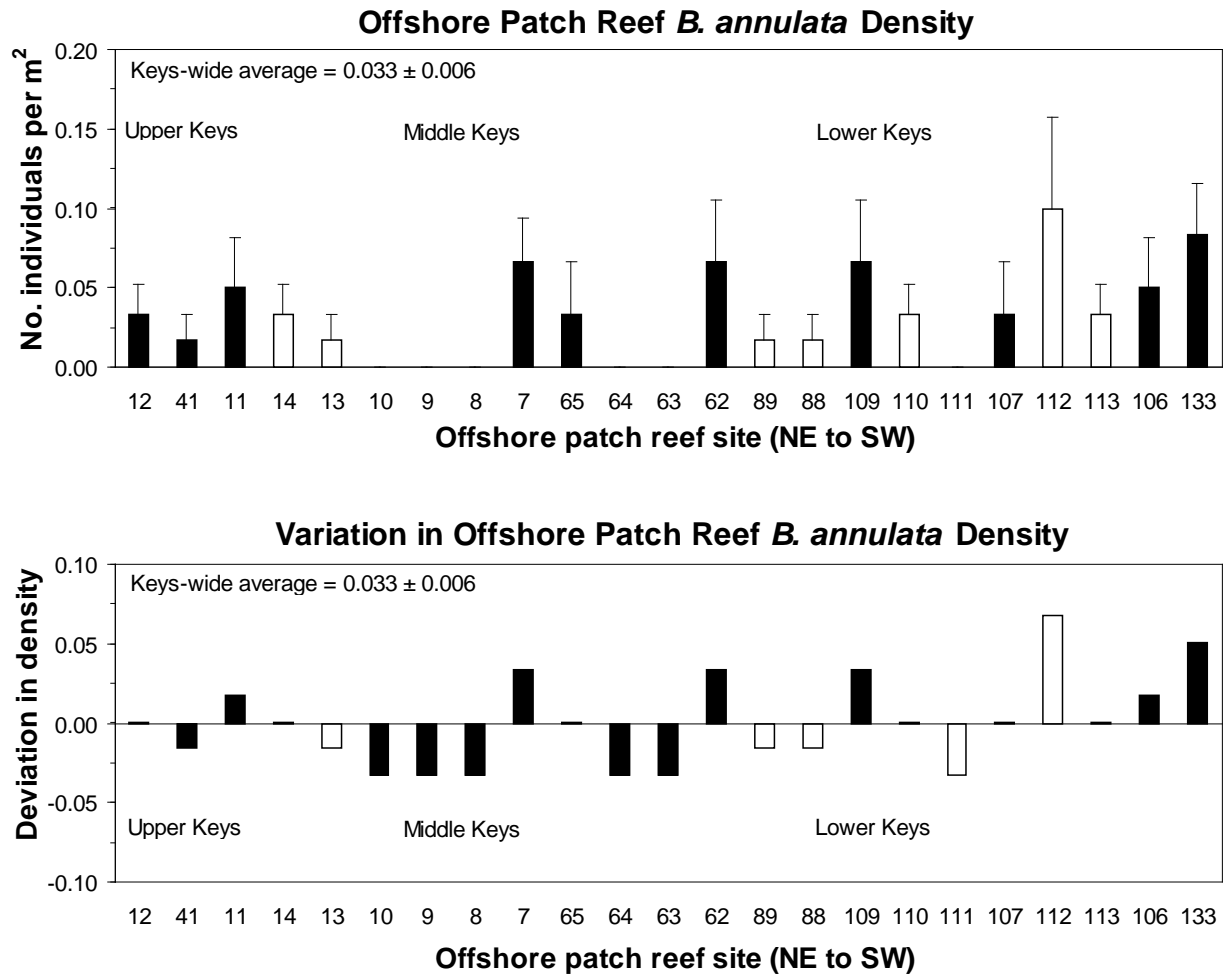


Figure 62. Mean (± 1 SE) densities (no. per m^2) of the corkscrew anemone (*Bartholomea annulata*) on shallow (< 6 m), high-relief spur and groove reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

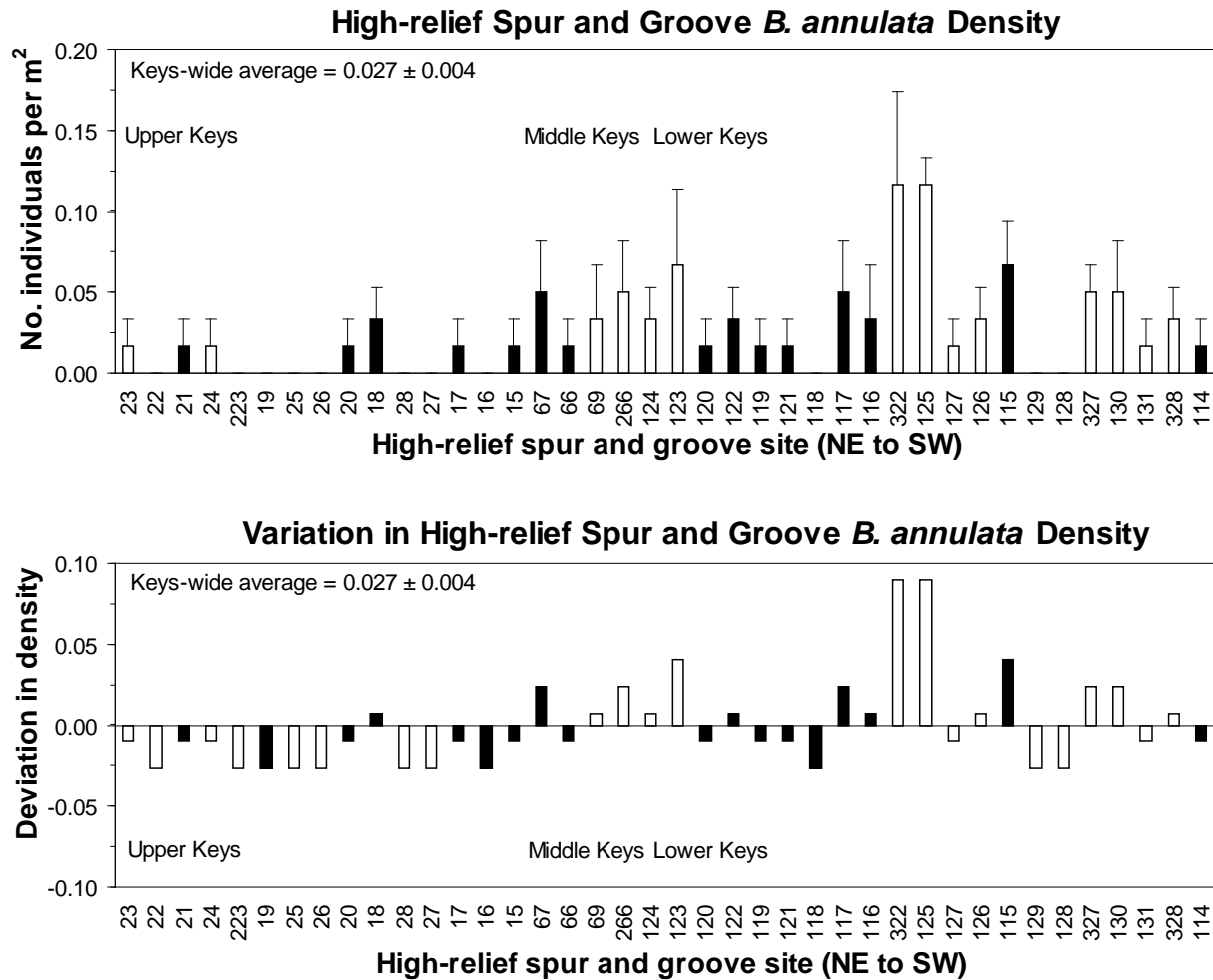


Figure 63. Mean (± 1 SE) densities (no. per m^2) of the corkscrew anemone (*Bartholomea annulata*) on deeper (6-15 m) fore-reef sites (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

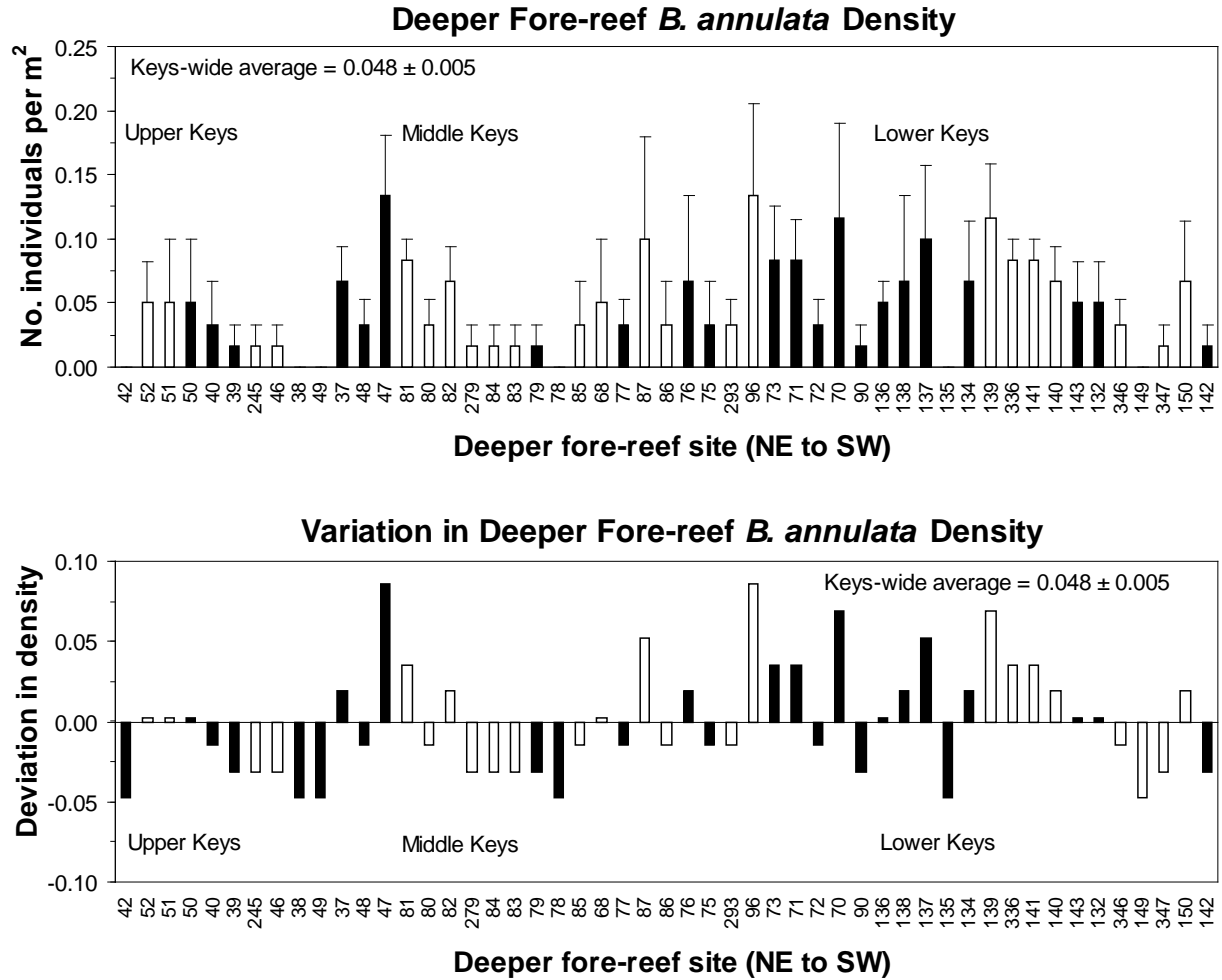


Figure 64. Corallimorpharians (Cnidaria, Anthozoa, Corallimorpharia) surveyed for density and habitat distribution in the Florida Keys during 2008.

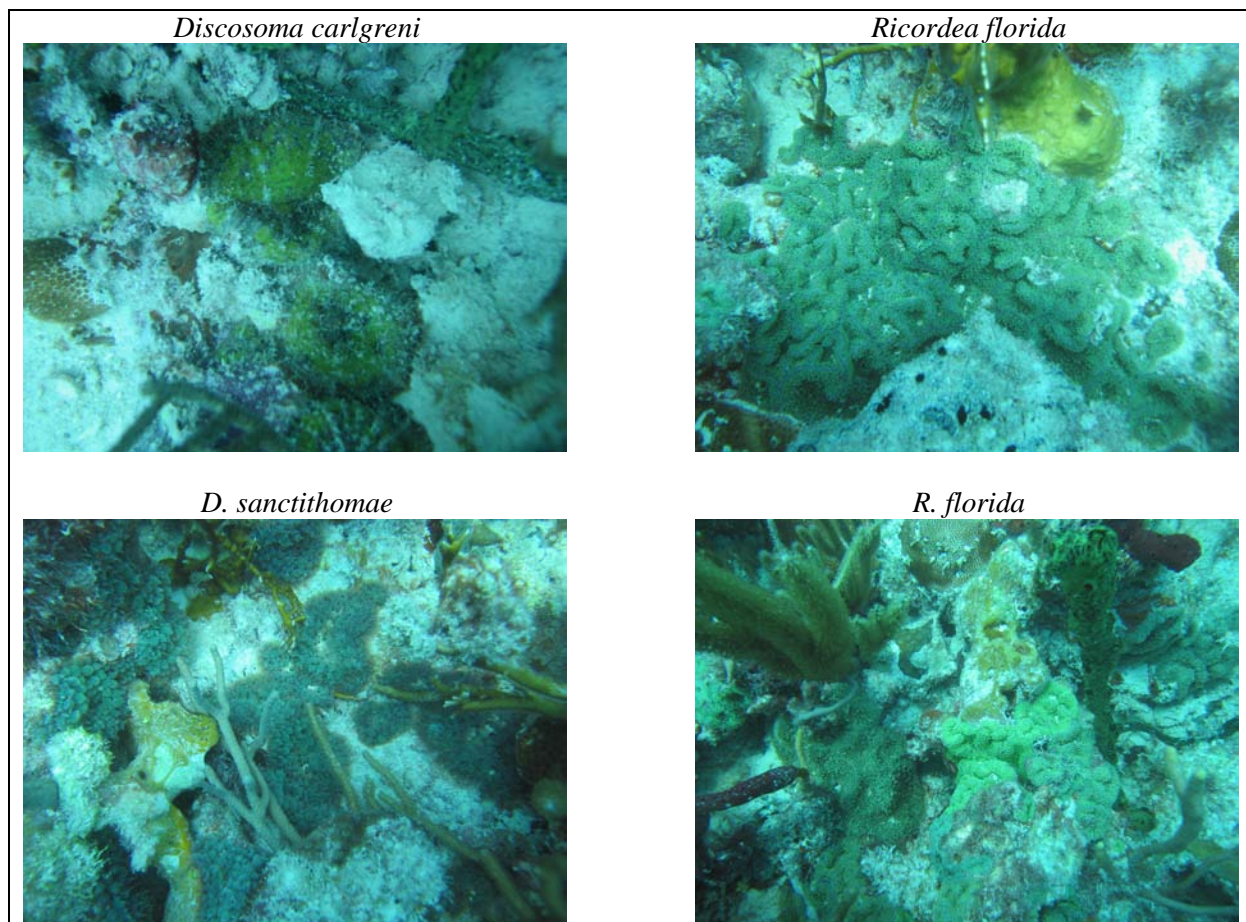


Figure 65. Mean (+ 1 SE) densities (no. per m²) of the Florida corallimorph (*Ricordea florida*) on mid-channel patch reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

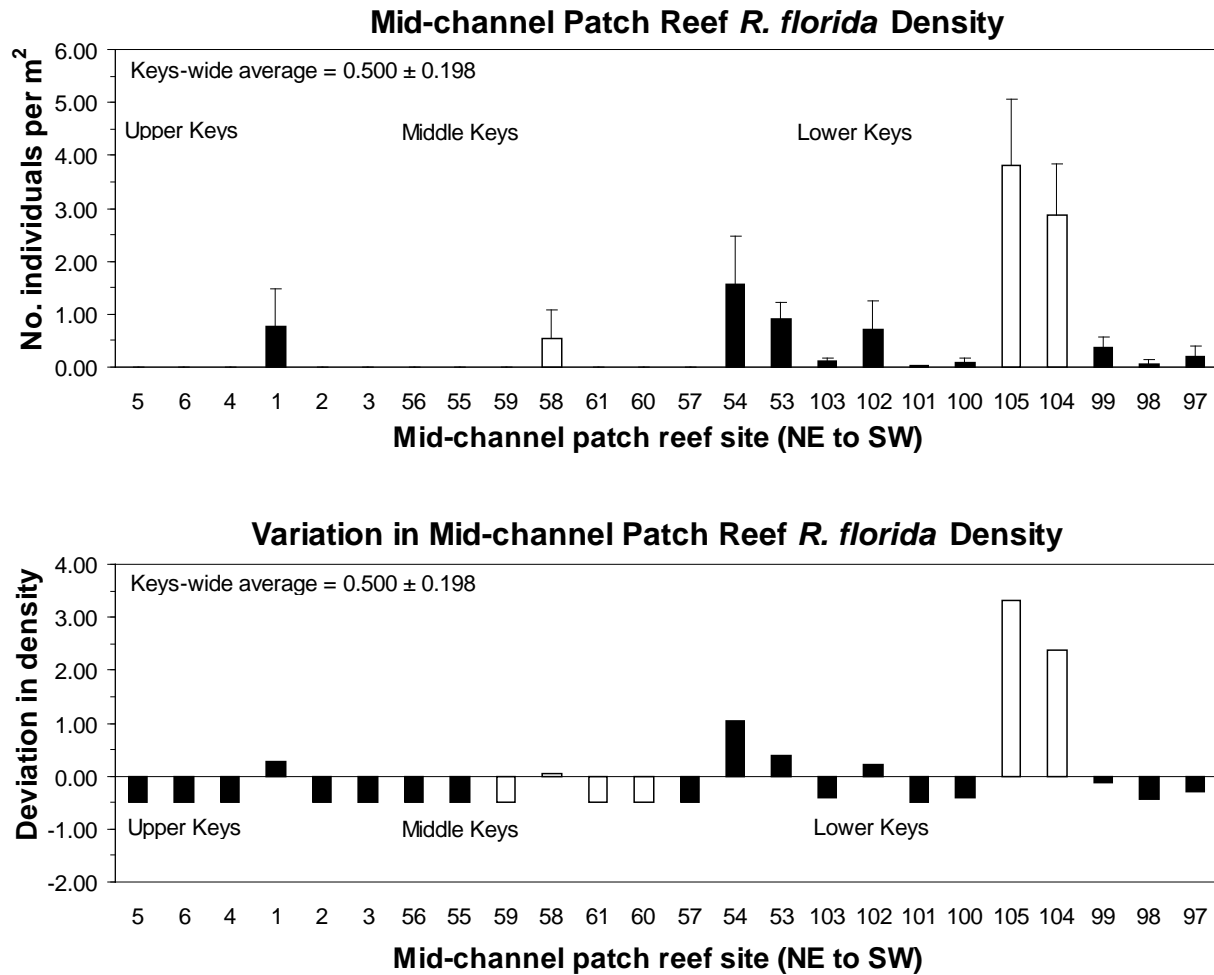


Figure 66. Mean (+ 1 SE) densities (no. per m²) of the Florida corallimorph (*Ricordea florida*) on offshore patch reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

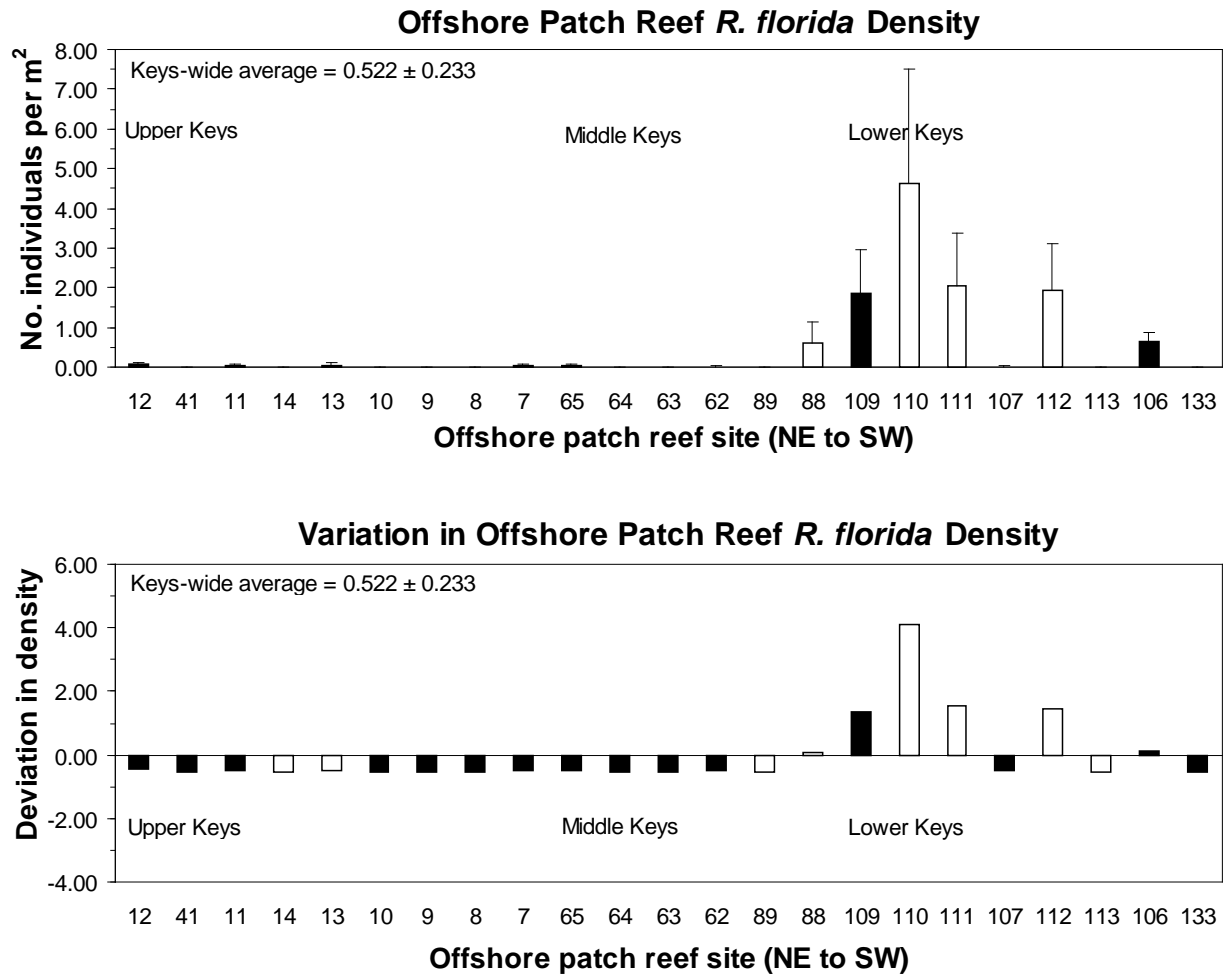


Figure 67. Mean (+ 1 SE) densities (no. per m²) of the Florida corallimorph (*Ricordea florida*) on shallow (< 6 m), high-relief spur and groove reefs (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

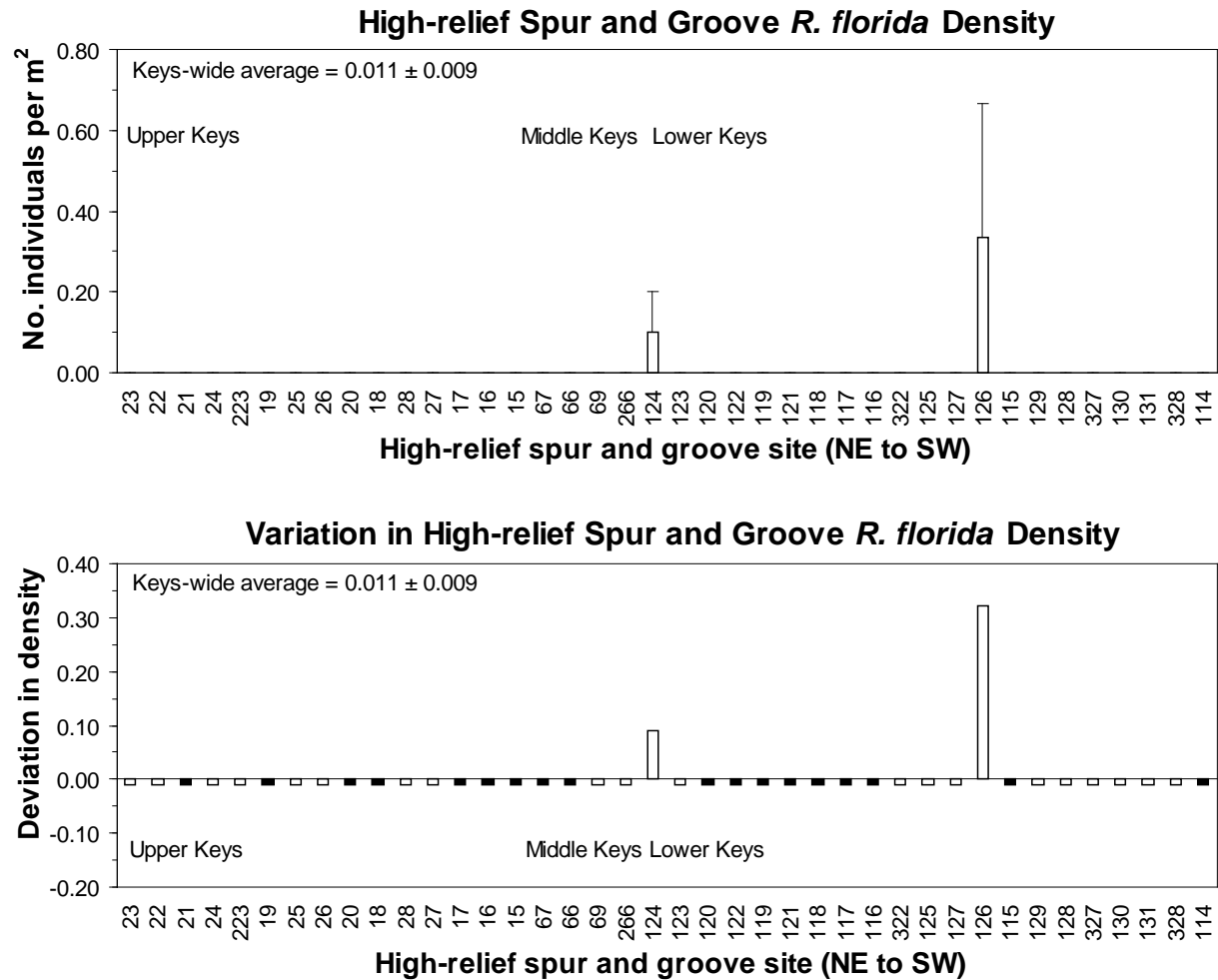


Figure 68. Mean (+ 1 SE) densities (no. per m²) of the Florida corallimorph (*Ricordea florida*) on deeper (6-15 m) fore-reef sites (top) and variations in site-level densities relative to the Keys-wide average (bottom). Open bars = FKNMS no-take zones; filled bars = reference areas.

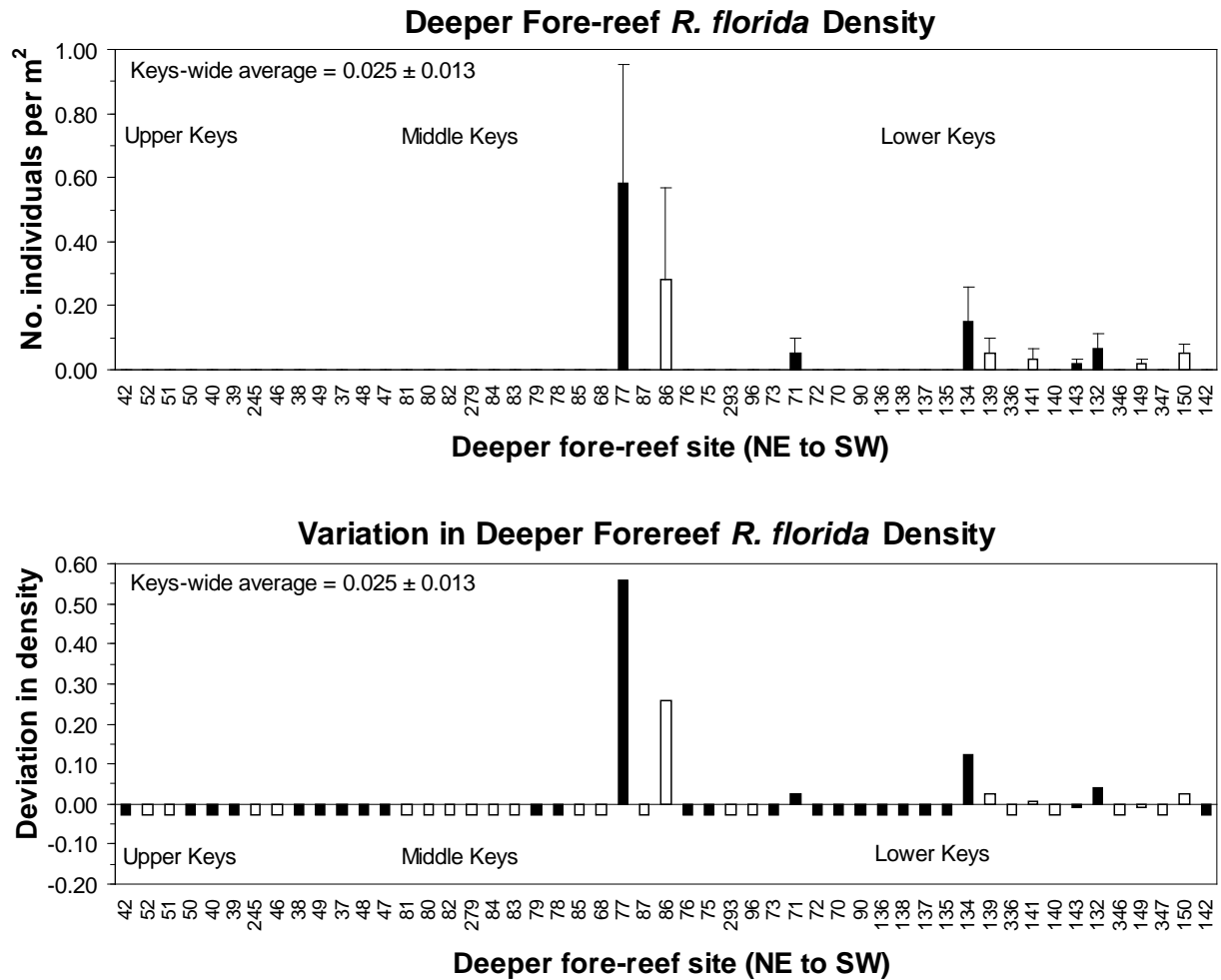


Table 17. Number of individuals (N) and mean \pm 1 SE densities (no. of individuals per m²) for the anemones *Bartholomea annulata*, *Condylactis gigantea*, and *Epicystes crucifera* in the Florida Keys National Marine Sanctuary, as determined from surveys of four 15-m x 1-m belt transects per site at 145 sites during June-August 2008. Sites are arranged by habitat from northeast to southwest and asterisked locations (**) are no-take marine reserves.

Site number/site location	<i>Bartholomea annulata</i>		<i>Condylactis gigantea</i>		<i>Epicystes crucifera</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
<i>Mid-channel patch reefs</i>						
Upper Florida Keys NMS						
6 - Basin Hill Shoals	3	0.050 \pm 0.017	4	0.067 \pm 0.027	0	0 \pm 0
5 - Basin Hill Shoals	5	0.083 \pm 0.050	1	0.017 \pm 0.017	0	0 \pm 0
4 - Inshore of Grecian Rocks	3	0.050 \pm 0.032	0	0 \pm 0	0	0 \pm 0
3 - South of Cannon Patch Reef	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
2 - Mosquito Bank	2	0.033 \pm 0.033	0	0 \pm 0	0	0 \pm 0
1 - Inshore of Molasses Reef	3	0.050 \pm 0.032	0	0 \pm 0	0	0 \pm 0
Upper Florida Keys Total (6)	16	0.044 \pm 0.011	5	0.014 \pm 0.011	0	0 \pm 0
Middle Florida Keys NMS						
56 - Tavernier Rocks	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
55 - Tavernier Rocks	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
59 - Hen and Chickens SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
58 - Hen and Chickens SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
61 - Cheeca Rocks SPA**	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
60 - Cheeca Rocks SPA**	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
57 - NE of Cheeca Rocks SPA	0	0 \pm 0	0	0 \pm 0	1	0.017 \pm 0.017
54 - South of Duck Key	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
53 - South of Ohio Key	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
Middle Florida Keys Total (9)	4	0.007 \pm 0.003	1	0.002 \pm 0.002	1	0.002 \pm 0.002
Lower Florida Keys NMS						
103 - North of Looe Key RO	0	0 \pm 0	0	0 \pm 0	1	0.017 \pm 0.017
102 - North of Maryland Shoal	2	0.033 \pm 0.033	0	0 \pm 0	0	0 \pm 0
101 - North of Maryland Shoal	1	0.017 \pm 0.017	0	0 \pm 0	1	0.017 \pm 0.017
100 - North of Eastern Sambo	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
105 - Western Sambo ER**	1	0.017 \pm 0.017	0	0 \pm 0	19	0.317 \pm 0.110
104 - Western Sambo ER**	1	0.017 \pm 0.017	0	0 \pm 0	1	0.017 \pm 0.017
99 - West of Western Sambo	3	0.050 \pm 0.032	0	0 \pm 0	0	0 \pm 0
98 - Middle Ground	7	0.117 \pm 0.074	0	0 \pm 0	0	0 \pm 0
97 - Middle Ground	5	0.083 \pm 0.017	2	0.033 \pm 0.019	4	0.067 \pm 0.027
Lower Florida Keys Total (9)	21	0.039 \pm 0.013	2	0.004 \pm 0.004	26	0.048 \pm 0.034
Mid-channel Patch Reef Total (24)	41	0.028 \pm 0.006	8	0.006 \pm 0.003	27	0.019 \pm 0.013
<i>Offshore patch reefs</i>						
Upper Florida Keys NMS						
12 - South of BNP boundary	2	0.033 \pm 0.019	1	0.017 \pm 0.017	0	0 \pm 0
41 - North of Carysfort Reef SPA	1	0.017 \pm 0.017	1	0.017 \pm 0.017	0	0 \pm 0
11 - North of Carysfort Reef SPA	3	0.050 \pm 0.032	0	0 \pm 0	0	0 \pm 0
14 - Carysfort Reef SPA**	2	0.033 \pm 0.019	0	0 \pm 0	0	0 \pm 0
13 - Carysfort Reef SPA**	1	0.017 \pm 0.017	1	0.017 \pm 0.017	0	0 \pm 0
10 - North of Dry Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
9 - SW of Grecian Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
8 - Inshore of French Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
7 - Inshore of Pickles Reef	4	0.067 \pm 0.027	1	0.017 \pm 0.017	0	0 \pm 0
Upper Florida Keys Total (9)	13	0.024 \pm 0.008	4	0.007 \pm 0.003	0	0 \pm 0
Middle Florida Keys NMS						
65 - North of Davis Reef SPA	2	0.033 \pm 0.033	3	0.050 \pm 0.017	0	0 \pm 0
64 - North of Davis Reef SPA	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0

Site number/site location	<i>Bartholomea annulata</i>		<i>Condylactis gigantea</i>		<i>Epicystes crucifera</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
63 - North of Davis Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
62 - North of Davis Reef SPA	4	0.067 ± 0.038	2	0.033 ± 0.019	0	0 ± 0
89 - Coffins Patch SPA**	1	0.017 ± 0.017	1	0.017 ± 0.017	0	0 ± 0
88 - Coffins Patch SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (6)	8	0.022 ± 0.010	7	0.019 ± 0.008	0	0 ± 0
Lower Florida Keys NMS						
109 - East of Looe Key RO	4	0.067 ± 0.038	0	0 ± 0	0	0 ± 0
110 - Looe Key Research Only**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
111 - Looe Key Research Only**	0	0 ± 0	0	0 ± 0	1	0.017 ± 0.017
107 - North of Pelican Shoal	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
112 - Western Sambo ER**	6	0.100 ± 0.058	1	0.017 ± 0.017	1	0.017 ± 0.017
113 - Western Sambo ER**	2	0.033 ± 0.019	1	0.017 ± 0.017	2	0.033 ± 0.033
106 - NE of E. Dry Rocks SPA	3	0.050 ± 0.032	0	0 ± 0	1	0.017 ± 0.017
133 - NE of E. Dry Rocks SPA	5	0.083 ± 0.032	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (8)	24	0.050 ± 0.011	2	0.004 ± 0.003	5	0.010 ± 0.004
Offshore Patch Reef Total (23)	45	0.033 ± 0.006	13	0.009 ± 0.003	5	0.004 ± 0.002
<i>Inner line reef tract spur & groove</i>						
Upper Florida Keys NMS						
32 - Turtle Rocks	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
31 - Inshore of Elbow Reef SPA	3	0.050 ± 0.032	0.017	0.017 ± 0.017	1	0.017 ± 0.017
30 - North Dry Rocks	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
34 - Dry Rocks SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
33 - Dry Rocks SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
36 - Grecian Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
35 - Grecian Rocks SPA**	3	0.050 ± 0.032	0.017	0.017 ± 0.017	0	0 ± 0
Upper Florida Keys Total (7)	13	0.031 ± 0.007	0.005	0.005 ± 0.003	1	0.002 ± 0.002
Inner Line Reef Tract Total (7)	13	0.031 ± 0.007	0.005	0.005 ± 0.003	1	0.002 ± 0.002
<i>High-relief spur & groove</i>						
Upper Florida Keys NMS						
23 - Carysfort Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
22 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
21 - Maitland grounding site	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
24 - Elbow Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
223 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
19 - North of French Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
25 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
26 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
20 - Sand Island	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
18 - Sand Island	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
28 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
27 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
17 - Pickles Reef	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
16 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
15 - Pickles Reef	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (15)	8	0.009 ± 0.003	0	0 ± 0	0	0 ± 0
Middle Florida Keys NMS						
67 - Delta Shoal	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
66 - Delta Shoal	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
69 - Sombrero Key SPA**	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
266 - Sombrero Key SPA**	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	9	0.038 ± 0.008	0	0 ± 0	0	0 ± 0
Lower Florida Keys NMS						

Site number/site location	<i>Bartholomea annulata</i>		<i>Condylactis gigantea</i>		<i>Epicystes crucifera</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
124 - Looe Key SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
123 - Looe Key SPA**	4	0.067 ± 0.047	0	0 ± 0	0	0 ± 0
120 - American Shoal	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
122 - American Shoal	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
119 - Maryland Shoal	1	0.017 ± 0.017	0	0 ± 0	1	0.017 ± 0.017
121 - Maryland Shoal	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
118 - Pelican Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
117 - Pelican Shoal	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
116 - No Name Reef	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
322 - Eastern Sambo RO**	7	0.117 ± 0.057	0	0 ± 0	0	0 ± 0
125 - Eastern Sambo RO**	7	0.117 ± 0.017	0	0 ± 0	0	0 ± 0
127 - Western Sambo ER**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
126 - Western Sambo ER**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
115 - East of E. Dry Rocks SPA	4	0.067 ± 0.027	0	0 ± 0	0	0 ± 0
129 - Eastern Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
128 - Eastern Dry Rocks**	0	0 ± 0	0	0 ± 0	0	0 ± 0
327 - Rock Key SPA**	3	0.050 ± 0.017	0	0 ± 0	0	0 ± 0
130 - Rock Key SPA**	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
131 - Sand Key SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
328 - Sand Key SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
114 - Western Dry Rocks	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (21)	47	0.037 ± 0.007	0	0 ± 0	1	0.001 ± 0.001
Spur & Groove Total (40)	64	0.027 ± 0.004	0	0 ± 0	0	0.0004 ± 0.0004
<i>Fore-reef (6-15 m)</i>						
Upper Florida Keys NMS						
42 - South of BNP boundary	0	0 ± 0	0	0 ± 0	0	0 ± 0
52 - Carysfort Reef SPA**	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
51 - Carysfort Reef SPA**	3	0.050 ± 0.050	0	0 ± 0	0	0 ± 0
50 - SW of Carysfort Reef SPA	3	0.050 ± 0.050	0	0 ± 0	0	0 ± 0
40 - SW of Carysfort Reef SPA	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
39 - North of Elbow Reef SPA	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
245 - Elbow Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
46 - Elbow Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
38 - SW of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
49 - South of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
37 - Dixie Shoal	4	0.067 ± 0.027	0	0 ± 0	0	0 ± 0
48 - Dixie Shoal	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
47 - SW of Molasses Reef SPA	8	0.133 ± 0.047	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (13)	28	0.036 ± 0.010	0	0 ± 0	0	0 ± 0
Middle Florida Keys NMS						
81 - Conch Reef SPA**	5	0.083 ± 0.017	0	0 ± 0	0	0 ± 0
80 - Conch Reef SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
82 - Conch Reef RO**	4	0.067 ± 0.027	0	0 ± 0	0	0 ± 0
279 - Conch Reef RO**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
84 - Davis Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
83 - Davis Reef SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
79 - SW of Crocker Reef	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
78 - SW of Crocker Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
85 - Alligator Reef SPA**	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
68 - Alligator Reef SPA**	3	0.050 ± 0.050	0	0 ± 0	0	0 ± 0
77 - SW of Alligator Reef SPA	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
87 - Tennessee Reef RO**	6	0.100 ± 0.079	0	0 ± 0	0	0 ± 0
86 - Tennessee Reef RO**	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
76 - NE of Tennessee Light	4	0.067 ± 0.067	0	0 ± 0	0	0 ± 0
75 - East of Coffins Patch SPA	2	0.033 ± 0.033	0	0 ± 0	0	0 ± 0
293 - Sombrero Key SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
96 - Sombrero Key SPA**	8	0.133 ± 0.072	0	0 ± 0	0	0 ± 0

Site number/site location	<i>Bartholomea annulata</i>		<i>Condylactis gigantea</i>		<i>Epicystes crucifera</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
73 - West of Sombrero Key SPA	5	0.083 ± 0.042	1	0.017 ± 0.017	0	0 ± 0
71 - South of Moser Channel	5	0.083 ± 0.032	0	0 ± 0	0	0 ± 0
72 - South of Moser Channel	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
70 - South of Moser Channel	7	0.117 ± 0.074	0	0 ± 0	0	0 ± 0
90 - South of Moser Channel	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	66	0.050 ± 0.008	1	0.001 ± 0.001	0	0 ± 0
Lower Florida Keys NMS						
136 - South of Bahia Honda Key	3	0.050 ± 0.017	0	0 ± 0	0	0 ± 0
138 - South of Bahia Honda Key	4	0.067 ± 0.067	0	0 ± 0	0	0 ± 0
137 - South of Bahia Honda Key	6	0.100 ± 0.058	0	0 ± 0	0	0 ± 0
135 - West of Looe Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
134 - West of Pelican Shoal	4	0.067 ± 0.047	0	0 ± 0	0	0 ± 0
139 - Eastern Sambo RO**	7	0.117 ± 0.042	0	0 ± 0	0	0 ± 0
336 - Eastern Sambo RO**	5	0.083 ± 0.017	0	0 ± 0	0	0 ± 0
141 - Western Sambo ER**	5	0.083 ± 0.017	0	0 ± 0	0	0 ± 0
140 - Western Sambo ER**	4	0.067 ± 0.027	0	0 ± 0	0	0 ± 0
143 - West of Western Sambo	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
132 - East of E. Dry Rocks SPA	3	0.050 ± 0.032	0	0 ± 0	0	0 ± 0
346 - Rock Key SPA**	2	0.033 ± 0.019	0	0 ± 0	0	0 ± 0
149 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
347 - Sand Key SPA**	1	0.017 ± 0.017	0	0 ± 0	0	0 ± 0
150 - Sand Key SPA**	4	0.067 ± 0.047	0	0 ± 0	0	0 ± 0
142 - SW of Sand Key SPA	1	0.017 ± 0.017	1	0.017 ± 0.017	0	0 ± 0
Lower Florida Keys Total (16)	52	0.054 ± 0.009	1	0.001 ± 0.001	1	0.001 ± 0.001
Fore-reef Total (51)	146	0.048 ± 0.005	2	0.001 ± 0.000	0	0.0003 ± 0.0003

Table 18. Number of individuals (N) and mean \pm 1 SE densities (no. of individuals per m²) for the anemones *Heteractis lucida*, *Lebrunia danae*, and *Stichodactyla helianthus* in the Florida Keys National Marine Sanctuary, as determined from surveys of four 15-m x 1-m belt transects per site at 145 sites during June-August 2008. Sites are arranged by habitat from northeast to southwest and asterisked locations (**) are no-take marine reserves.

Site number/site location	<i>Heteractis lucida</i>		<i>Lebrunia danae</i>		<i>Stichodactyla helianthus</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
<i>Mid-channel patch reefs</i>						
Upper Florida Keys NMS						
6 - Basin Hill Shoals	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
5 - Basin Hill Shoals	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
4 - Inshore of Grecian Rocks	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
3 - South of Cannon Patch Reef	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
2 - Mosquito Bank	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
1 - Inshore of Molasses Reef	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
Upper Florida Keys Total (6)	0	0 \pm 0	2	0.006 \pm 0.004	0	0 \pm 0
Middle Florida Keys NMS						
56 - Tavernier Rocks	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
55 - Tavernier Rocks	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
59 - Hen and Chickens SPA**	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
58 - Hen and Chickens SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
61 - Cheeca Rocks SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
60 - Cheeca Rocks SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
57 - NE of Cheeca Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
54 - South of Duck Key	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
53 - South of Ohio Key	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
Middle Florida Keys Total (9)	0	0 \pm 0	2	0.004 \pm 0.002	0	0 \pm 0
Lower Florida Keys NMS						
103 - North of Looe Key RO	0	0 \pm 0	3	0.050 \pm 0.032	0	0 \pm 0
102 - North of Maryland Shoal	0	0 \pm 0	11	0.183 \pm 0.057	0	0 \pm 0
101 - North of Maryland Shoal	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
100 - North of Eastern Sambo	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
105 - Western Sambo ER**	1	0.017 \pm 0.017	13	0.217 \pm 0.042	0	0 \pm 0
104 - Western Sambo ER**	1	0.017 \pm 0.017	6	0.100 \pm 0.058	0	0 \pm 0
99 - West of Western Sambo	0	0 \pm 0	2	0.033 \pm 0.033	0	0 \pm 0
98 - Middle Ground	0	0 \pm 0	35	0.583 \pm 0.210	0	0 \pm 0
97 - Middle Ground	0	0 \pm 0	16	0.267 \pm 0.082	0	0 \pm 0
Lower Florida Keys Total (9)	2	0.004 \pm 0.002	87	0.161 \pm 0.061	0	0 \pm 0
Mid-channel Patch Reef Total (24)	2	0.001 \pm 0.001	91	0.063 \pm 0.027	0	0 \pm 0
<i>Offshore patch reefs</i>						
Upper Florida Keys NMS						
12 - South of BNP boundary	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
41 - North of Carysfort Reef SPA	1	0.017 \pm 0.017	0	0 \pm 0	0	0 \pm 0
11 - North of Carysfort Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
14 - Carysfort Reef SPA**	0	0 \pm 0	1	0.017 \pm 0.017	0	0 \pm 0
13 - Carysfort Reef SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
10 - North of Dry Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
9 - SW of Grecian Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
8 - Inshore of French Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
7 - Inshore of Pickles Reef	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
Upper Florida Keys Total (9)	1	0.002 \pm 0.002	1	0.002 \pm 0.002	0	0 \pm 0
Middle Florida Keys NMS						
65 - North of Davis Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
64 - North of Davis Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0

Site number/site location	<i>Heteractis lucida</i>		<i>Lebrunia danae</i>		<i>Stichodactyla helianthus</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
63 - North of Davis Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
62 - North of Davis Reef SPA	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
89 - Coffins Patch SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
88 - Coffins Patch SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (6)	0	0 ± 0	1	0.003 ± 0.003	0	0 ± 0
Lower Florida Keys NMS						
109 - East of Looe Key RO	0	0 ± 0	2	0.033 ± 0.033	0	0 ± 0
110 - Looe Key Research Only**	0	0 ± 0	2	0.033 ± 0.033	0	0 ± 0
111 - Looe Key Research Only**	0	0 ± 0	0	0 ± 0	0	0 ± 0
107 - North of Pelican Shoal	0	0 ± 0	2	0.033 ± 0.033	0	0 ± 0
112 - Western Sambo ER**	0	0 ± 0	4	0.067 ± 0.027	0	0 ± 0
113 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	0	0 ± 0
106 - NE of E. Dry Rocks SPA	0	0 ± 0	5	0.083 ± 0.032	0	0 ± 0
133 - NE of E. Dry Rocks SPA	1	0.017 ± 0.017	17	0.283 ± 0.092	0	0 ± 0
Lower Florida Keys Total (8)	1	0.002 ± 0.002	32	0.067 ± 0.033	0	0 ± 0
Offshore Patch Reef Total (23)	2	0.001 ± 0.001	34	0.025 ± 0.013	0	0 ± 0
<i>Inner line reef tract spur & groove</i>						
Upper Florida Keys NMS						
32 - Turtle Rocks	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
31 - Inshore of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
30 - North Dry Rocks	0	0 ± 0	0	0 ± 0	0	0 ± 0
34 - Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
33 - Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
36 - Grecian Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
35 - Grecian Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (7)	0	0 ± 0	1	0.002 ± 0.002	0	0 ± 0
Inner Line Reef Tract Total (7)	0	0 ± 0	1	0.002 ± 0.002	0	0 ± 0
<i>High-relief spur & groove</i>						
Upper Florida Keys NMS						
23 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
22 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
21 - Maitland grounding site	0	0 ± 0	0	0 ± 0	0	0 ± 0
24 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
223 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
19 - North of French Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
25 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
26 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
20 - Sand Island	0	0 ± 0	0	0 ± 0	0	0 ± 0
18 - Sand Island	0	0 ± 0	0	0 ± 0	0	0 ± 0
28 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
27 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
17 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
16 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
15 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (15)	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys NMS						
67 - Delta Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
66 - Delta Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
69 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
266 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys NMS						

Site number/site location	<i>Heteractis lucida</i>		<i>Lebrunia danae</i>		<i>Stichodactyla helianthus</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
124 - Looe Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
123 - Looe Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
120 - American Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
122 - American Shoal	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
119 - Maryland Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
121 - Maryland Shoal	0	0 ± 0	1	0.017 ± 0.017	9	0.150 ± 0.096
118 - Pelican Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
117 - Pelican Shoal	0	0 ± 0	3	0.050 ± 0.032	0	0 ± 0
116 - No Name Reef	0	0 ± 0	5	0.083 ± 0.032	0	0 ± 0
322 - Eastern Sambo RO**	0	0 ± 0	3	0.050 ± 0.032	0	0 ± 0
125 - Eastern Sambo RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
127 - Western Sambo ER**	0	0 ± 0	2	0.033 ± 0.019	0	0 ± 0
126 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	0	0 ± 0
115 - East of E. Dry Rocks SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
129 - Eastern Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
128 - Eastern Dry Rocks**	0	0 ± 0	0	0 ± 0	0	0 ± 0
327 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
130 - Rock Key SPA**	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
131 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
328 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
114 - Western Dry Rocks	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (21)	0	0 ± 0	16	0.013 ± 0.005	9	0.007 ± 0.007
Spur & Groove Total (40)	0	0 ± 0	16	0.007 ± 0.003	9	0.004 ± 0.004
<i>Fore-reef (6-15 m)</i>						
Upper Florida Keys NMS						
42 - South of BNP boundary	0	0 ± 0	0	0 ± 0	0	0 ± 0
52 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
51 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
50 - SW of Carysfort Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
40 - SW of Carysfort Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
39 - North of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
245 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
46 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
38 - SW of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
49 - South of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
37 - Dixie Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
48 - Dixie Shoal	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
47 - SW of Molasses Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (13)	0	0 ± 0	1	0.001 ± 0.001	0	0 ± 0
Middle Florida Keys NMS						
81 - Conch Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
80 - Conch Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
82 - Conch Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
279 - Conch Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
84 - Davis Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
83 - Davis Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
79 - SW of Crocker Reef	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
78 - SW of Crocker Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
85 - Alligator Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
68 - Alligator Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
77 - SW of Alligator Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
87 - Tennessee Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
86 - Tennessee Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
76 - NE of Tennessee Light	0	0 ± 0	0	0 ± 0	0	0 ± 0
75 - East of Coffins Patch SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
293 - Sombrero Key SPA**	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
96 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0

Site number/site location	<i>Heteractis lucida</i>		<i>Lebrunia danae</i>		<i>Stichodactyla helianthus</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
73 - West of Sombrero Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
71 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
72 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
70 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
90 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	0	0 ± 0	2	0.002 ± 0.001	0	0 ± 0
Lower Florida Keys NMS						
136 - South of Bahia Honda Key	0	0 ± 0	0	0 ± 0	0	0 ± 0
138 - South of Bahia Honda Key	0	0 ± 0	0	0 ± 0	0	0 ± 0
137 - South of Bahia Honda Key	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
135 - West of Looe Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
134 - West of Pelican Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
139 - Eastern Sambo RO**	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
336 - Eastern Sambo RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
141 - Western Sambo ER**	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
140 - Western Sambo ER**	0	0 ± 0	2	0.033 ± 0.019	0	0 ± 0
143 - West of Western Sambo	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
132 - East of E. Dry Rocks SPA	0	0 ± 0	3	0.050 ± 0.032	0	0 ± 0
346 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
149 - Rock Key SPA**	0	0 ± 0	1	0.017 ± 0.017	0	0 ± 0
347 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
150 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
142 - SW of Sand Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (16)	0	0 ± 0	10	0.010 ± 0.004	0	0 ± 0
Fore-reef Total (51)	0	0 ± 0	13	0.004 ± 0.001	0	0 ± 0

Table 19. Number of individuals (N) and mean \pm 1 SE densities (no. of individuals per m²) for the corallimorpharians *Discosoma carlgreni*, *D. sanctithomae*, and *Ricordea florida* in the Florida Keys National Marine Sanctuary, as determined from surveys of four 15-m x 1-m belt transects per site at 145 sites during June-August 2008. Sites are arranged by habitat from northeast to southwest and asterisked locations (**) are no-take marine reserves.

Site number/site location	<i>Discosoma carlgreni</i>		<i>D. sanctithomae</i>		<i>Ricordea florida</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
<i>Mid-channel patch reefs</i>						
Upper Florida Keys NMS						
6 - Basin Hill Shoals	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
5 - Basin Hill Shoals	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
4 - Inshore of Grecian Rocks	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
3 - South of Cannon Patch Reef	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
2 - Mosquito Bank	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
1 - Inshore of Molasses Reef	0	0 \pm 0	0	0 \pm 0	46	0.767 \pm 0.723
Upper Florida Keys Total (6)	0	0 \pm 0	0	0 \pm 0	46	0.128 \pm 0.128
Middle Florida Keys NMS						
56 - Tavernier Rocks	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
55 - Tavernier Rocks	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
59 - Hen and Chickens SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
58 - Hen and Chickens SPA**	0	0 \pm 0	0	0 \pm 0	32	0.533 \pm 0.533
61 - Cheeca Rocks SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
60 - Cheeca Rocks SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
57 - NE of Cheeca Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
54 - South of Duck Key	0	0 \pm 0	0	0 \pm 0	93	1.550 \pm 0.922
53 - South of Ohio Key	0	0 \pm 0	0	0 \pm 0	54	0.900 \pm 0.333
Middle Florida Keys Total (9)	0	0 \pm 0	0	0 \pm 0	179	0.331 \pm 0.187
Lower Florida Keys NMS						
103 - North of Looe Key RO	0	0 \pm 0	0	0 \pm 0	6	0.100 \pm 0.064
102 - North of Maryland Shoal	3	0.050 \pm 0.032	204	3.400 \pm 2.006	43	0.717 \pm 0.530
101 - North of Maryland Shoal	0	0 \pm 0	0	0 \pm 0	1	0.017 \pm 0.017
100 - North of Eastern Sambo	0	0 \pm 0	0	0 \pm 0	5	0.083 \pm 0.083
105 - Western Sambo ER**	12	0.200 \pm 0.200	142	2.367 \pm 0.847	229	3.817 \pm 1.250
104 - Western Sambo ER**	1	0.017 \pm 0.017	33	0.550 \pm 0.183	173	2.883 \pm 0.969
99 - West of Western Sambo	0	0 \pm 0	0	0 \pm 0	22	0.367 \pm 0.212
98 - Middle Ground	1	0.017 \pm 0.017	53	0.883 \pm 0.817	4	0.067 \pm 0.067
97 - Middle Ground	0	0 \pm 0	21	0.350 \pm 0.223	12	0.200 \pm 0.200
Lower Florida Keys Total (9)	17	0.031 \pm 0.022	453	0.839 \pm 0.409	495	0.917 \pm 0.472
Mid-channel Patch Reef Total (24)	22	0.015 \pm 0.009	453	0.315 \pm 0.170	720	0.500 \pm 0.198
<i>Offshore patch reefs</i>						
Upper Florida Keys NMS						
12 - South of BNP boundary	0	0 \pm 0	0	0 \pm 0	4	0.067 \pm 0.047
41 - North of Carysfort Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
11 - North of Carysfort Reef SPA	0	0 \pm 0	0	0 \pm 0	2	0.033 \pm 0.033
14 - Carysfort Reef SPA**	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
13 - Carysfort Reef SPA**	0	0 \pm 0	0	0 \pm 0	3	0.050 \pm 0.050
10 - North of Dry Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
9 - SW of Grecian Rocks SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
8 - Inshore of French Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0
7 - Inshore of Pickles Reef	0	0 \pm 0	0	0 \pm 0	2	0.033 \pm 0.033
Upper Florida Keys Total (9)	0	0 \pm 0	0	0 \pm 0	11	0.020 \pm 0.009
Middle Florida Keys NMS						
65 - North of Davis Reef SPA	0	0 \pm 0	0	0 \pm 0	2	0.033 \pm 0.033
64 - North of Davis Reef SPA	0	0 \pm 0	0	0 \pm 0	0	0 \pm 0

Site number/site location	<i>Discosoma carlgreni</i>		<i>D. sanctithomae</i>		<i>Ricordea florida</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
63 - North of Davis Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
62 - North of Davis Reef SPA	0	0 ± 0	0	0 ± 0	1	0.017 ± 0.017
89 - Coffins Patch SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
88 - Coffins Patch SPA**	0	0 ± 0	0	0 ± 0	37	0.617 ± 0.529
Middle Florida Keys Total (6)	0	0 ± 0	0	0 ± 0	40	0.111 ± 0.101
Lower Florida Keys NMS						
109 - East of Looe Key RO	0	0 ± 0	0	0 ± 0	112	1.867 ± 1.090
110 - Looe Key Research Only**	0	0 ± 0	0	0 ± 0	278	4.633 ± 2.888
111 - Looe Key Research Only**	0	0 ± 0	0	0 ± 0	123	2.050 ± 1.320
107 - North of Pelican Shoal	0	0 ± 0	0	0 ± 0	1	0.017 ± 0.017
112 - Western Sambo ER**	0	0 ± 0	4	0.067 ± 0.047	117	1.950 ± 1.144
113 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	0	0 ± 0
106 - NE of E. Dry Rocks SPA	0	0 ± 0	0	0 ± 0	38	0.633 ± 0.232
133 - NE of E. Dry Rocks SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (8)	0	0 ± 0	4	0.008 ± 0.008	669	1.394 ± 0.564
Offshore Patch Reef Total (23)	0	0 ± 0	4	0.003 ± 0.003	720	0.522 ± 0.233
<i>Inner line reef tract spur & groove</i>						
Upper Florida Keys NMS						
32 - Turtle Rocks	0	0 ± 0	0	0 ± 0	0	0 ± 0
31 - Inshore of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	38	0.633 ± 0.140
30 - North Dry Rocks	0	0 ± 0	0	0 ± 0	0	0 ± 0
34 - Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
33 - Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
36 - Grecian Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
35 - Grecian Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (7)	0	0 ± 0	0	0 ± 0	38	0.190 ± 0.090
Inner Line Reef Tract Total (7)	0	0 ± 0	0	0 ± 0	38	0.190 ± 0.090
<i>High-relief spur & groove</i>						
Upper Florida Keys NMS						
23 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
22 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
21 - Maitland grounding site	0	0 ± 0	0	0 ± 0	0	0 ± 0
24 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
223 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
19 - North of French Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
25 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
26 - French Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
20 - Sand Island	0	0 ± 0	0	0 ± 0	0	0 ± 0
18 - Sand Island	0	0 ± 0	0	0 ± 0	0	0 ± 0
28 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
27 - Molasses Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
17 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
16 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
15 - Pickles Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (15)	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys NMS						
67 - Delta Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
66 - Delta Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
69 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
266 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys NMS						

Site number/site location	<i>Discosoma carlgreni</i>		<i>D. sanctithomae</i>		<i>Ricordea florida</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
124 - Looe Key SPA**	0	0 ± 0	0	0 ± 0	6	0.100 ± 0.100
123 - Looe Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
120 - American Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
122 - American Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
119 - Maryland Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
121 - Maryland Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
118 - Pelican Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
117 - Pelican Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
116 - No Name Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
322 - Eastern Sambo RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
125 - Eastern Sambo RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
127 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	0	0 ± 0
126 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	20	0.333 ± 0.333
115 - East of E. Dry Rocks SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
129 - Eastern Dry Rocks SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
128 - Eastern Dry Rocks**	0	0 ± 0	0	0 ± 0	0	0 ± 0
327 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
130 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
131 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
328 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
114 - Western Dry Rocks	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (21)	0	0 ± 0	0	0 ± 0	26	0.021 ± 0.016
Spur & Groove Total (40)	0	0 ± 0	0	0 ± 0	26	0.011 ± 0.009
<i>Fore-reef (6-15 m)</i>						
Upper Florida Keys NMS						
42 - South of BNP boundary	0	0 ± 0	0	0 ± 0	0	0 ± 0
52 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
51 - Carysfort Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
50 - SW of Carysfort Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
40 - SW of Carysfort Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
39 - North of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
245 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
46 - Elbow Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
38 - SW of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
49 - South of Elbow Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
37 - Dixie Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
48 - Dixie Shoal	0	0 ± 0	0	0 ± 0	0	0 ± 0
47 - SW of Molasses Reef SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (13)	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys NMS						
81 - Conch Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
80 - Conch Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
82 - Conch Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
279 - Conch Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
84 - Davis Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
83 - Davis Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
79 - SW of Crocker Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
78 - SW of Crocker Reef	0	0 ± 0	0	0 ± 0	0	0 ± 0
85 - Alligator Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
68 - Alligator Reef SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
77 - SW of Alligator Reef SPA	0	0 ± 0	0	0 ± 0	35	0.583 ± 0.369
87 - Tennessee Reef RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
86 - Tennessee Reef RO**	0	0 ± 0	0	0 ± 0	17	0.283 ± 0.283
76 - NE of Tennessee Light	0	0 ± 0	0	0 ± 0	0	0 ± 0
75 - East of Coffins Patch SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
293 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
96 - Sombrero Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0

Site number/site location	<i>Discosoma carlgreni</i>		<i>D. sanctithomae</i>		<i>Ricordea florida</i>	
	N	No. per m ²	N	No. per m ²	N	No. per m ²
73 - West of Sombrero Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
71 - South of Moser Channel	0	0 ± 0	0	0 ± 0	3	0.050 ± 0.050
72 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
70 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
90 - South of Moser Channel	0	0 ± 0	0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	0	0 ± 0	0	0 ± 0	55	0.042 ± 0.029
Lower Florida Keys NMS						
136 - South of Bahia Honda Key	0	0 ± 0	0	0 ± 0	0	0 ± 0
138 - South of Bahia Honda Key	0	0 ± 0	0	0 ± 0	0	0 ± 0
137 - South of Bahia Honda Key	0	0 ± 0	0	0 ± 0	0	0 ± 0
135 - West of Looe Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
134 - West of Pelican Shoal	0	0 ± 0	1	0.017 ± 0.017	9	0.150 ± 0.110
139 - Eastern Sambo RO**	0	0 ± 0	1	0.017 ± 0.017	3	0.050 ± 0.050
336 - Eastern Sambo RO**	0	0 ± 0	0	0 ± 0	0	0 ± 0
141 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	2	0.033 ± 0.033
140 - Western Sambo ER**	0	0 ± 0	0	0 ± 0	0	0 ± 0
143 - West of Western Sambo	0	0 ± 0	0	0 ± 0	1	0.017 ± 0.017
132 - East of E. Dry Rocks SPA	0	0 ± 0	0	0 ± 0	4	0.067 ± 0.047
346 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
149 - Rock Key SPA**	0	0 ± 0	0	0 ± 0	1	0.017 ± 0.017
347 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	0	0 ± 0
150 - Sand Key SPA**	0	0 ± 0	0	0 ± 0	3	0.050 ± 0.032
142 - SW of Sand Key SPA	0	0 ± 0	0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (16)	0	0 ± 0	2	0.002 ± 0.001	23	0.024 ± 0.010
Fore-reef Total (51)	0	0 ± 0	2	0.001 ± 0.000	78	0.025 ± 0.013