

## VIII. Mollusk Density

### Background

The Florida Keys marine ecosystem supports a diverse fauna of gastropod mollusks belonging to several orders. Opisthobranch mollusks, for example, are represented by at least 30 species of sea slugs (Sacoglossa) and 23 species of nudibranchs (Nudibranchia) (Clark and DeFreese 1987; Levy et al. 1996), including at least three endemic species (Clark 1994). Data on the status and trends of mollusk populations and habitat utilization patterns in the Florida Keys, with the exception of queen conch (*Strombus gigas*), are limited (Marcus 1960; Jensen and Clark 1983; Clark and DeFreese 1987), as most previous studies have been qualitative in nature (Clark 1994; Trowbridge 2002). Most recently, Clark (1994) noted a declining population trend of the lettuce sea slug, *Elysia (Tridachia) crispata* Mörch (see cladistic analyses in Gosliner 1995; Jensen 1996) in southern Florida, based upon qualitative comparisons of occurrence and population densities between 1969-80 and 1987-93. About 50% of the nearshore populations assessed by Clark (1994) over a decade ago were declining due to habitat destruction, siltation, eutrophication, and over-collection, particularly in nearshore habitats.

Since 2001, we have conducted intermittent surveys of various gastropod mollusk species in conjunction with other benthic assessments. For example, we encountered unusually high densities of lettuce sea slugs among 63 shallow fore reef sites during June-September 2001. While sacoglossans are not particularly rare in many shallow-water marine habitats where densities correlate with algal biomass (Clarke and DeFreese 1987), our observations offshore were unusual because fleshy algal cover tends to be relatively low (Chiappone et al. 1997; Miller et al. 2002). In 2007 we surveyed *Coralliophila* snail predation on *Acropora* corals and also quantified the density two other Neogastropoda species that were especially abundant in high-relief spur and groove habitats. During 2001 and 2008-2009, we surveyed *Cyphoma* abundance, size, and gorgonian host occupation patterns (see Chapter V). During 2009, four 15-m x 1-m belt transects per site at all 160 sites (9,600 m<sup>2</sup>) were surveyed for the following sacoglossan, nudibranch, and neogastropoda mollusks:

- The lettuce sea slug, *Elysia (Tradachia) crispata* (Mörch), Class Gastropoda, Subclass Opisthobranchia, Order Sacoglossa, Family Elysiidae;
- The nudibranchs *Hypselodoris edenticulata* (Florida regal sea goddess), *H. bayeri* (black-spotted sea goddess), *Chromodoris kempfi* (purple-crowned sea goddess), *C. nyalia* (red-line blue sea goddess), and *Glossodoris sedna* (red-tipped sea goddess) of the Class Gastropoda, Subclass Opisthobranchia, Order Nudibranchia; and

- The Neogastropoda mollusks *Thais deltoidea* (Lamarck) of the Family Thaididae, *Coralliophila* sp. of the Family Coralliophilidae, and *Leucozonia nassa* (Gmelin) of the Family Fasciolaridae.

Of these targeted species, all except three nudibranch species were recorded during 2009 (Figure 8-1).

## 2009 Survey Results

A total of 9,600 m<sup>2</sup> of benthic habitat was surveyed during 2009 for the aforementioned gastropod mollusks. Data on the density, size, and gorgonian host occupation patterns of flamingo-tongue snails (*Cyphoma*) are presented in Chapter V. The 2009 surveys yielded two nudibranch species, one of which (*Chromodoris kempfi*) we have not previously recorded, one sacoglossan sea slug, and three Neogastropoda snails. Tables 8-1 to 8-3 provide site-level density and transect frequency of occurrence data. Nudibranch species observed in previous years, but not recorded during 2009, included *Hypselodoris edenticulata* (Florida regal sea goddess), *H. bayeri* (black-spotted sea goddess), and *Glossodoris sedna* (red-tipped sea goddess). Four individuals of *C. kempfi* were recorded from just two sites, and at both locations (Conch Reef SPA, Carysfort/S. Carysfort SPA), pairs of individuals were found intertwined together on algal turf substrate. Only one individual of *C. nyalya* (red-line blue sea goddess) was found at a low-relief spur and groove site SE of Turtle Rocks (Table 8-1).

A total of 170 individuals of the lettuce sea slug (*Elysia crispata*) were recorded and individuals were only found in high-relief spur and groove habitat (Table 8-2). This distribution pattern matches historical surveys of this species conducted in 2001, 2005, and 2007. A maximum site-level density of  $0.55 \pm 0.12$  individuals per m<sup>2</sup> was recorded from a high-relief spur and groove site at Western Dry Rocks. In the high-relief spur and groove habitat, *E. crispata* was found on  $32\% \pm 6\%$  of all transects, with an overall mean habitat density of  $0.067 \pm 0.019$  individuals per m<sup>2</sup>. In this same habitat, individuals were only found in the lower Keys ( $35\% \pm 9\%$  of all transects,  $0.072 \pm 0.031$  per m<sup>2</sup>) and upper Keys ( $35\% \pm 10\%$  of all transects,  $0.078 \pm 0.029$  per m<sup>2</sup>). In the lower Keys, transect frequency of occurrence was two times greater in no-take zones, while mean densities were roughly similar between no-take zones and reference sites. In the upper Keys, transect frequency of occurrence was nearly six times greater and mean density 10 times greater in no-take zones compared to reference sites.

Three Neogastropoda mollusks were surveyed during 2009 and observations were similar to those from 2007 (Tables 8-2 and 8-3). A total of 28 *Coralliophila* sp. individuals were found and these snails were only recorded from an offshore patch reef (29% of individuals) and several high-relief spur and groove sites (71%). The maximum site-level density was  $0.283 \pm 0.283$  individuals per m<sup>2</sup> recorded from high-

relief spur and groove at Western Sambo ER (Table 8-2). *Coralliophila* sp. exhibited a highly aggregated distribution and was always found in clusters of individuals on the edges of live coral colonies. Similar results were obtained in 2007, where most individuals were found in high-relief spur and groove habitat on live coral.

Similar to 2007, the most abundant neogastropoda mollusk surveyed in 2009 was the deltoid rock shell (*Thais deltoidea*). A total of 1,162 individuals were found, with 96% recorded from high-relief spur and groove habitat (Table 8-3). Transect frequency of occurrence ( $79\% \pm 5\%$ ) and mean density ( $0.442 \pm 0.073$ ) were substantially higher in high-relief spur and groove compared to all other habitats sampled. This is similar to 2007, where nearly 90% of all individuals were recorded in this habitat type. The maximum site-level density of  $1.87 \pm 0.30$  individuals per  $m^2$  was recorded from a high-relief spur and groove site at Western Dry Rocks. In the high-relief spur and groove habitat, there was a slightly higher frequency of occurrence ( $88\% \pm 6\%$ ), but substantially greater mean density in the lower Keys ( $0.703 \pm 0.120$  per  $m^2$ ) compared to the middle ( $75\% \pm 10\%$ ,  $0.342 \pm 0.221$ ) and upper Keys ( $69\% \pm 9\%$ ,  $0.174 \pm 0.036$  per  $m^2$ ) regions. In addition, there was a slightly higher frequency of occurrence (92% vs. 81%) and density (0.794 vs. 0.567 per  $m^2$ ) between no-take zones and reference areas, respectively, in the lower Keys. A similar pattern was evident in the upper Keys region. Similar to observations in 2007, *T. deltoidea* was found nearly exclusively on algal turf or crustose coralline algae.

The third gastropod mollusk sampled during 2009 was the common lesser tulip shell (*Leucozonia nassa*) (Figure 8-1), a species that exhibited the widest habitat distribution of the three neogastropod mollusks sampled. A total of 202 individuals were found, and similar to *T. deltoidea*, more than 90% were recorded from high-relief spur and groove habitat. Transect frequency of occurrence ( $40\% \pm 6\%$ ) and mean density ( $0.073 \pm 0.015$ ) were substantially higher in high-relief spur and groove compared to all other habitats sampled (Table 8-3). The maximum site-level density of  $0.317 \pm 0.050$  per  $m^2$  was recorded from a high-relief spur and groove site within Molasses Reef SPA. In this same habitat, there was a substantially higher frequency of occurrence ( $55\% \pm 9\%$ ) and mean density ( $0.103 \pm 0.022$  per  $m^2$ ) in the lower Keys compared to the middle ( $25\% \pm 25\%$ ,  $0.063 \pm 0.063$  per  $m^2$ ) and upper Keys ( $26\% \pm 8\%$ ,  $0.041 \pm 0.018$  per  $m^2$ ). However, there were no obvious differences in frequency of occurrence (58% vs. 50%) or mean density (0.107 vs. 0.098 per  $m^2$ ) between no-take zones and reference areas, respectively, in the lower Keys. Similar to *T. deltoidea*, most *L. nassa* snails were found on either crustose coralline algae or algal turf.

Figure 8-1. Selected mollusks surveyed for habitat distribution and density in the Florida Keys during 2009.

*Coralliophila* sp.



*Coralliophila* sp.



*Thais deltoidea*



*Leucozonia nassa*



*Elysia (Tridachia) crispata*



*Chromodoris kempfi*



Table 8-1. Mean  $\pm$  1 SE proportional station frequencies, numbers of individuals recorded (N), and densities (no. individuals per m<sup>2</sup>) of the nudibranchs *Chromodoris kempfi* and *C. nyalya* in the Florida Keys, as determined from surveys of four 15-m x 1-m belt transects per site at 160 sites during 2009. Sites are arranged by habitat from SW to NE and asterisked locations (\*\*) are no-take zones.

Site number/site location	<i>C. kempfi</i>			<i>C. nyalya</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>Inshore patch reefs</i>						
Lower Florida Keys						
S01 – SE of Ballast Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S02 – South of Sugarloaf Creek	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S03 – Newfound Harbor SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S04 – Newfound Harbor SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Lower Florida Keys Total (4)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
<b>Inshore Patch Reef Total (4)</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>
<i>Mid-channel patch reefs</i>						
Lower Florida Keys						
S12 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S13 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S05 - North of Middle Sambo Reef	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S06 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U04 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S07 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S08 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S09 - North of Maryland Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S10 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S11 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Lower Florida Keys Total (10)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys						
U40 - Marker 49A	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S58 - Marker 48	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S59 - East Turtle Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S96 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S97 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S94 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S95 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys Total (7)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys						
S89 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S90 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S91 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S92 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S93 - Turtle Rocks	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys Total (5)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
<b>Mid-channel Patch Reef Total (22)</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>
<i>Offshore patch reefs</i>						
Lower Florida Keys						
S14 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S15 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S16 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S19 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S20 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U12 - West of Looe Key RO	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S17 - Looe Key RO**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0

Site number/site location	<i>C. kempfi</i>			<i>C. nyalya</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S18 - Looe Key RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S60 - NE of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S61 - West Turtle Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S63 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S62 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S69 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S70 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S64 - South of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U42 - East of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
S99 - Wolf Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T04 - Inshore of Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T03 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T05 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T09 - South of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T08 - West of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T06 - West of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T07 - SW of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T31 - South of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T20 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T19 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T24 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (12)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Offshore Patch Reef Total (28)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>
<i>Low-relief hard-bottom (&lt; 6 m)</i>						
Lower Florida Keys						
S21 - East of E. Dry Rocks SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S22 - West of Looe Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (2)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S65 - SE of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S66 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S68 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S67 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T16 - West of Alligator Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T45 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T46 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V03 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T36 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T21 - Conch Reef SPA**	0.25 ± 0.25	2	0.033 ± 0.033	0 ± 0	0	0 ± 0
T22 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (11)	0.02 ± 0.02	2	0.003 ± 0.003	0 ± 0	0	0 ± 0
Upper Florida Keys						
T28 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T29 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T17 - North of French Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T18 - Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Shallow Hard-bottom Total (17)</b>	<b>0.01 ± 0.01</b>	<b>2</b>	<b>0.002 ± 0.002</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>

Site number/site location	<i>C. kempfi</i>			<i>C. nyalya</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>High-relief spur and groove</i>						
Lower Florida Keys						
S32 - Western Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S46 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S47 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S44 - Rock Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S45 - Rock Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S42 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S43 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S40 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S41 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S33 - Middle Sambo Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S38 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S39 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U15 - No Name Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S24 - East of Eastern Sambo RO	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U24 - Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U23 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S34 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S35 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S36 - Looe Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S37 - Looe Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (20)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S78 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S79 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S76 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S77 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
T32 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T43 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T44 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T33 - Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T34 - Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T41 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T42 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T14 - Grecian Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T15 - Grecian Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T12 - Key Largo Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T13 - Key Largo Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T10 - North-North Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T39 - Elbow Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T40 - Elbow Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T35 - South of South Carysfort	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T37 - South Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T38 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T11 - North of Turtle Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (18)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Spur and Groove Total (44)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>
<i>Deeper Fore-reef (6-15 m)</i>						
Lower Florida Keys						
U19 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S27 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S23 - East of Rock Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S54 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S55 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0

Site number/site location	<i>C. kempfi</i>			<i>C. nyalya</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S48 - East of Western Sambo ER	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S49 - Middle Sambo Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S52 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S53 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U22 - West of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S30 - East of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S31 - East of Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S51 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S50 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (14)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S71 - South of Bahia Honda	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S80 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S74 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S72 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S86 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S85 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S73 - East of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S81 - SW of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S75 - Marker 20	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S82 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S83 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S84 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T56 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T57 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T54 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T55 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T47 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T23 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T52 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T53 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V09 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V10 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
U98 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U87 - Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U84 - North of Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T30 - South of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T50 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T26 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T51 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T27 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T25 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T48 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T49 - SE of Turtle Rocks	0 ± 0	0	0 ± 0	0.25 ± 0.25	1	0.017 ± 0.017
Upper Florida Keys Total (11)	0 ± 0	0	0 ± 0	0.02 ± 0.02	1	0.002 ± 0.002
<b>Deeper Fore-reef Total (47)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0.01 ± 0.01</b>	<b>1</b>	<b>0.001 ± 0.001</b>



Table 8-2. Mean  $\pm$  1 SE proportional station frequencies, numbers of individuals recorded (N), and densities (no. individuals per m<sup>2</sup>) of the sacoglossan *Elysia crispata* and the gastropod *Coralliophila* sp. in the Florida Keys, as determined from surveys of four 15-m x 1-m belt transects per site at 160 sites during 2009. Sites are arranged by habitat from SW to NE and asterisked locations (\*\*) are no-take zones.

Site number/site location	<i>E. crispata</i>			<i>Coralliophila</i> sp.		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>Inshore patch reefs</i>						
Lower Florida Keys						
S01 – SE of Ballast Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S02 – South of Sugarloaf Creek	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S03 – Newfound Harbor SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S04 – Newfound Harbor SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Lower Florida Keys Total (4)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
<b>Inshore Patch Reef Total (4)</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>
<i>Mid-channel patch reefs</i>						
Lower Florida Keys						
S12 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S13 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S05 - North of Middle Sambo Reef	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S06 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U04 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S07 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S08 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S09 - North of Maryland Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S10 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S11 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Lower Florida Keys Total (10)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys						
U40 - Marker 49A	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S58 - Marker 48	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S59 - East Turtle Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S96 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S97 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S94 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S95 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys Total (7)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys						
S89 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S90 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S91 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S92 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S93 - Turtle Rocks	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys Total (5)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
<b>Mid-channel Patch Reef Total (22)</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>
<i>Offshore patch reefs</i>						
Lower Florida Keys						
S14 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S15 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S16 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S19 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S20 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U12 - West of Looe Key RO	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S17 - Looe Key RO**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0

Site number/site location	<i>E. crispata</i>			<i>Coralliophila</i> sp.		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S18 - Looe Key RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S60 - NE of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S61 - West Turtle Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S63 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S62 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S69 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S70 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S64 - South of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U42 - East of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
S99 - Wolf Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T04 - Inshore of Sand Island	0 ± 0	0	0 ± 0	0.25 ± 0.25	8	0.133 ± 0.133
T03 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T05 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T09 - South of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T08 - West of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T06 - West of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T07 - SW of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T31 - South of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T20 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T19 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T24 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (12)	0 ± 0	0	0 ± 0	0.02 ± 0.02	8	0.011 ± 0.011
<b>Offshore Patch Reef Total (28)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0.01 ± 0.01</b>	<b>8</b>	<b>0.005 ± 0.005</b>
<i>Low-relief hard-bottom (&lt; 6 m)</i>						
Lower Florida Keys						
S21 - East of E. Dry Rocks SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S22 - West of Looe Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (2)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S65 - SE of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S66 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S68 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S67 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T16 - West of Alligator Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T45 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T46 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V03 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T36 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T21 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T22 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (11)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
T28 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T29 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T17 - North of French Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T18 - Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Shallow Hard-bottom Total (17)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>

Site number/site location	<i>E. crispata</i>			<i>Coralliophila</i> sp.		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>High-relief spur and groove</i>						
Lower Florida Keys						
S32 - Western Dry Rocks	1.00 ± 0.00	33	0.550 ± 0.120	0 ± 0	0	0 ± 0
S46 - Sand Key SPA**	0.50 ± 0.29	3	0.050 ± 0.032	0 ± 0	0	0 ± 0
S47 - Sand Key SPA**	1.00 ± 0.00	17	0.283 ± 0.42	0 ± 0	0	0 ± 0
S44 - Rock Key SPA**	1.00 ± 0.00	6	0.100 ± 0.33	0 ± 0	0	0 ± 0
S45 - Rock Key SPA**	0.50 ± 0.29	2	0.033 ± 0.019	0 ± 0	0	0 ± 0
S42 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0.25 ± 0.25	1	0.017 ± 0.017
S43 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S40 - Western Sambo ER**	0 ± 0	0	0 ± 0	0.25 ± 0.25	17	0.283 ± 0.283
S41 - Western Sambo ER**	0.25 ± 0.25	2	0.033 ± 0.033	0 ± 0	0	0 ± 0
S33 - Middle Sambo Reef	0.50 ± 0.29	3	0.050 ± 0.032	0 ± 0	0	0 ± 0
S38 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S39 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U15 - No Name Reef	0.25 ± 0.25	1	0.017 ± 0.017	0 ± 0	0	0 ± 0
S24 - East of Eastern Sambo RO	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U24 - Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U23 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S34 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S35 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S36 - Looe Key SPA**	1.00 ± 0.00	6	0.100 ± 0.019	0 ± 0	0	0 ± 0
S37 - Looe Key SPA**	1.00 ± 0.00	13	0.217 ± 0.088	0 ± 0	0	0 ± 0
Lower Florida Keys Total (20)	0.35 ± 0.09	86	0.072 ± 0.031	0.03 ± 0.02	18	0.015 ± 0.014
Middle Florida Keys						
S78 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S79 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S76 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S77 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
T32 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T43 - Molasses Reef SPA**	0.25 ± 0.25	1	0.017 ± 0.017	0 ± 0	0	0 ± 0
T44 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T33 - Sand Island	0.50 ± 0.29	4	0.067 ± 0.047	0.25 ± 0.25	2	0.033 ± 0.033
T34 - Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T41 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T42 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T14 - Grecian Rocks SPA**	1.00 ± 0.00	18	0.300 ± 0.148	0 ± 0	0	0 ± 0
T15 - Grecian Rocks SPA**	1.00 ± 0.00	11	0.183 ± 0.057	0 ± 0	0	0 ± 0
T12 - Key Largo Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T13 - Key Largo Dry Rocks SPA**	0.25 ± 0.25	1	0.017 ± 0.017	0 ± 0	0	0 ± 0
T10 - North-North Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T39 - Elbow Reef SPA**	0.75 ± 0.25	3	0.050 ± 0.017	0 ± 0	0	0 ± 0
T40 - Elbow Reef SPA**	0.75 ± 0.25	8	0.133 ± 0.047	0 ± 0	0	0 ± 0
T35 - South of South Carysfort	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T37 - South Carysfort Reef SPA**	1.00 ± 0.00	25	0.417 ± 0.074	0 ± 0	0	0 ± 0
T38 - Carysfort Reef SPA**	0.75 ± 0.25	13	0.217 ± 0.074	0 ± 0	0	0 ± 0
T11 - North of Turtle Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (18)	0.35 ± 0.10	84	0.078 ± 0.029	0.01 ± 0.01	2	0.002 ± 0.002
<b>Spur and Groove Total (44)</b>	<b>0.32 ± 0.06</b>	<b>170</b>	<b>0.067 ± 0.019</b>	<b>0.02 ± 0.01</b>	<b>20</b>	<b>0.008 ± 0.007</b>
<i>Deeper Fore-reef (6-15 m)</i>						
Lower Florida Keys						
U19 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S27 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S23 - East of Rock Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S54 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S55 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0

Site number/site location	<i>E. crispata</i>			<i>Coralliophila</i> sp.		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S48 - East of Western Sambo ER	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S49 - Middle Sambo Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S52 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S53 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U22 - West of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S30 - East of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S31 - East of Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S51 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S50 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (14)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S71 - South of Bahia Honda	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S80 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S74 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S72 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S86 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S85 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S73 - East of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S81 - SW of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S75 - Marker 20	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S82 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S83 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S84 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T56 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T57 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T54 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T55 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T47 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T23 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T52 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T53 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V09 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V10 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
U98 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U87 - Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U84 - North of Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T30 - South of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T50 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T26 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T51 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T27 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T25 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T48 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T49 - SE of Turtle Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (11)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Deeper Fore-reef Total (47)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>

Table 8-3. Mean  $\pm$  1 SE proportional station frequencies, numbers of individuals recorded (N), and densities (no. individuals per m<sup>2</sup>) of the gastropods *Thais deltoidea* and *Leucozonia nassa* in the Florida Keys, as determined from surveys of four 15-m x 1-m belt transects per site at 160 sites during 2009. Sites are arranged by habitat from SW to NE and asterisked locations (\*\*) are no-take zones.

Site number/site location	<i>T. deltoidea</i>			<i>L. nassa</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>Inshore patch reefs</i>						
Lower Florida Keys						
S01 – SE of Ballast Key	0	0	0 $\pm$ 0	0.25 $\pm$ 0.25	1	0.017 $\pm$ 0.017
S02 – South of Sugarloaf Creek	0	0	0 $\pm$ 0	0.25 $\pm$ 0.25	2	0.033 $\pm$ 0.033
S03 – Newfound Harbor SPA**	0.25 $\pm$ 0.25	1	0.031 $\pm$ 0.031	0.50 $\pm$ 0.29	2	0.033 $\pm$ 0.019
S04 – Newfound Harbor SPA**	0.50 $\pm$ 0.29	9	0.150 $\pm$ 0.088	0 $\pm$ 0	0	0
Lower Florida Keys Total (4)	0.19 $\pm$ 0.12	10	0.042 $\pm$ 0.036	0.25 $\pm$ 0.10	5	0.021 $\pm$ 0.008
<b>Inshore Patch Reef Total (4)</b>	<b>0.19 <math>\pm</math> 0.12</b>	<b>10</b>	<b>0.042 <math>\pm</math> 0.036</b>	<b>0.25 <math>\pm</math> 0.10</b>	<b>5</b>	<b>0.021 <math>\pm</math> 0.008</b>
<i>Mid-channel patch reefs</i>						
Lower Florida Keys						
S12 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S13 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S05 - North of Middle Sambo Reef	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S06 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U04 - North of Pelican Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S07 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S08 - West Washerwoman Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S09 - North of Maryland Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S10 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S11 - North of American Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Lower Florida Keys Total (10)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys						
U40 - Marker 49A	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S58 - Marker 48	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S59 - East Turtle Shoal	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S96 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S97 - Cheeca Rocks SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S94 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S95 - Hen and Chickens Reef SPA**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Middle Florida Keys Total (7)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys						
S89 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S90 - Mosquito Bank	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S91 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S92 - Basin Hill Shoals	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S93 - Turtle Rocks	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
Upper Florida Keys Total (5)	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
<b>Mid-channel Patch Reef Total (22)</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>	<b>0 <math>\pm</math> 0</b>	<b>0</b>	<b>0 <math>\pm</math> 0</b>
<i>Offshore patch reefs</i>						
Lower Florida Keys						
S14 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S15 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S16 - North of Sand Key	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S19 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S20 - Western Sambo ER**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
U12 - West of Looe Key RO	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0
S17 - Looe Key RO**	0 $\pm$ 0	0	0 $\pm$ 0	0 $\pm$ 0	0	0 $\pm$ 0

Site number/site location	<i>T. deltoidea</i>			<i>L. nassa</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S18 - Looe Key RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S60 - NE of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S61 - West Turtle Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S63 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S62 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S69 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S70 - Coffins Patch SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S64 - South of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U42 - East of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (8)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
S99 - Wolf Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T04 - Inshore of Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T03 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T05 - White Bank	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T09 - South of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T08 - West of Key Largo Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T06 - West of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T07 - SW of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T31 - South of Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T20 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T19 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T24 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (12)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Offshore Patch Reef Total (28)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>
<i>Low-relief hard-bottom (&lt; 6 m)</i>						
Lower Florida Keys						
S21 - East of E. Dry Rocks SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S22 - West of Looe Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (2)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S65 - SE of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S66 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S68 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S67 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T16 - West of Alligator Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T45 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T46 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V03 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T36 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T21 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T22 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (11)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
T28 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T29 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T17 - North of French Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T18 - Watson's Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Shallow Hard-bottom Total (17)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>

Site number/site location	<i>T. deltoidea</i>			<i>L. nassa</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
<i>High-relief spur and groove</i>						
Lower Florida Keys						
S32 - Western Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S46 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S47 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S44 - Rock Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S45 - Rock Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S42 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S43 - Eastern Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S40 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S41 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S33 - Middle Sambo Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S38 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S39 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U15 - No Name Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S24 - East of Eastern Sambo RO	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U24 - Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U23 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S34 - Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S35 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S36 - Looe Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S37 - Looe Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (20)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S78 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S79 - Sombrero Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S76 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S77 - Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (4)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
T32 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T43 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T44 - Molasses Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T33 - Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T34 - Sand Island	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T41 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T42 - French Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T14 - Grecian Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T15 - Grecian Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T12 - Key Largo Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T13 - Key Largo Dry Rocks SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T10 - North-North Dry Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T39 - Elbow Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T40 - Elbow Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T35 - South of South Carysfort	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T37 - South Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T38 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T11 - North of Turtle Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (18)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Spur and Groove Total (44)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>
<i>Deeper Fore-reef (6-15 m)</i>						
Lower Florida Keys						
U19 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S27 - Sand Key SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S23 - East of Rock Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S54 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S55 - Western Sambo ER**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0

Site number/site location	<i>T. deltoidea</i>			<i>L. nassa</i>		
	Frequency	N	No./m <sup>2</sup>	Frequency	N	No./m <sup>2</sup>
S48 - East of Western Sambo ER	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S49 - Middle Sambo Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S52 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S53 - Eastern Sambo RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U22 - West of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S30 - East of Pelican Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S31 - East of Maryland Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S51 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S50 - American Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Lower Florida Keys Total (14)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys						
S71 - South of Bahia Honda	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S80 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S74 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S72 - West of Sombrero Key	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S86 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S85 - Sombrero Key SPA	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S73 - East of Delta Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S81 - SW of Coffins Patch	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S75 - Marker 20	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S82 - Tennessee Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S83 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
S84 - Tennessee Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T56 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T57 - Alligator Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T54 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T55 - Davis Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T47 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T23 - Little Conch Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T52 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T53 - Conch Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V09 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
V10 - Conch Reef RO**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Middle Florida Keys Total (22)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys						
U98 - Pickles Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U87 - Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
U84 - North of Dixie Shoal	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T30 - South of Elbow Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T50 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T26 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T51 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T27 - Carysfort Reef SPA**	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T25 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T48 - North of Carysfort Reef	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
T49 - SE of Turtle Rocks	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
Upper Florida Keys Total (11)	0 ± 0	0	0 ± 0	0 ± 0	0	0 ± 0
<b>Deeper Fore-reef Total (47)</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>	<b>0 ± 0</b>	<b>0</b>	<b>0 ± 0</b>