IV. Coral and Gorgonian Abundance

Coral density, size, and condition

A total of 820 m^2 of hard-bottom and coral reef habitat was surveyed for the abundance, size, and condition of stony coral colonies among the 43 Tortugas sites. Table 4-1 lists the site-level densities for *Millepora*, Scleractinia, and total stony corals. Of the 3,312 colonies sampled, 915 (28%) colonies were *Millepora* spp., most of which were *M. alcicornis*. A total of 2,397 scleractinian corals representing 40 taxa were identified, counted, and measured for colony condition. Site-level mean densities ranged from 0.25 to 10.92 colonies per m^2 (Table 4-1) and abundance patterns largely mirrored the pattern of coral cover, meaning greater coral densities were found on mid-depth (6-15 m) and deeper (> 15 m) medium and high-relief reef habitats (Figure 4-1). Deeper reef knoll and reef terrace habitats in both the park and on the Tortugas Bank generally yielded the greatest coral densities (Figure 4-2), observations similar to those in 2006 and previous years. For all 43 sites combined, the dominant scleractinian corals by colony abundance were *Porites astreoides* (497 colonies, 20.7%), *Montastraea cavernosa* (434 colonies, 18.1%), *M. faveolata* (276 colonies, 11.5%), and *Siderastrea siderea* (276 colonies, 11.5%), which comprised ~62% of the total corals sampled. Densities of *Acropora cervicornis* were extremely low at the sites visited during 2008 (maximum of 0.15 colonies per m^2) and colonies of this species were only observed at four sites, three of which are shallow (6-15 m) medium-profile reefs within DTNP. For *Montastraea cavernosa*, mean densities of 1+ colonies per m^2 were recorded at 10 sites, all of which are medium-profile reefs, reef knolls, and reef terraces in both the park and on the Tortugas Bank. A similar pattern was found for *M. faveolata* and *Siderastrea siderea*. *Porites astreoides* was more broadly distributed than these species and was abundant on shallower low-relief hard-bottom and medium-profile reefs in addition to deeper reef habitats.

The coral condition measurements conducted during 2008 included assessments of competition, predation, bleaching, and disease. As in previous years, the disease prevalence in the habitats and depth range surveyed was relatively low (less than 5%), and included black band, "white diseases" such as white plague, and dark spot syndrome. Similar to 2006, there were several locations in 2008 with higher disease prevalence observed, especially white plague. Several disease or disease-like conditions were noted during 2008: 1) dark spot syndrome affecting primarily *Siderastrea siderea* and *Stephanocoenia michelini*, 2) white plague that was affecting a variety of species, 3) dead white skeleton of unknown causes, perhaps caused by snail predation, and 4) tissue necrosis (Figure 4-3). A summary of the size and percent dead skeleton for some of the more common species, as well as the more important reef framework builders, is as follows. A total of 68 colonies of *Colpophyllia natans* were measured, with a range and mean in maximum diameter of 6-200 cm and 53 ± 6 cm, respectively. The percentage of the

colony that was dead skeleton (and not live tissue) ranged from 0% (completely alive) to 91%, with a mean of 20 ± 3%. For *Diploria strigosa*, a total of 50 colonies measured, with a range and mean in maximum diameter of 4-40 cm and 14 ± 1 cm, respectively. The percentage of dead skeleton among the colonies ranged from 0% (completely alive) to 75%, with a mean of 10 ± 3%. Of the 434 *Montastraea cavernosa* colonies measured, the maximum diameter ranged from 4-100 cm, with a mean of 21 ± 1 cm. Percent dead skeleton ranged from 0% (completely alive) to 99%, averaging 17 ± 1%. A total of 276 colonies of *M. faveolata* and *Siderastrea siderea* were assessed, with a range in maximum diameter of 6-255 cm (mean of 54 ± 3 cm) and 4-70 cm (mean of 16 ± 1 cm), respectively. Percent dead skeleton for *M. faveolata* and *S. siderea* averaged 27 ± 2% and 15 ± 3%, respectively. The most abundant coral sampled, *Porites astreoides*, ranged in maximum diameter from 2 cm to 79 cm (mean 9.8 ± 0.3 cm) and the mean percent dead skeleton averaged 11 ± 1%.

Juvenile coral density

Scleractinian corals less ≤ 4.0 cm in maximum diameter were assessed in ten 0.65-cm x 0.48-cm quadrats sampled along each of two transects (6.24 m^2 per site) per site at the 43 Tortugas sites during May-June 2008 (except at site P276 = 5.62 m^2, B231 = 5.93 m^2, B223 = 3.12 m^2). Juveniles generally represent individuals that have recently (within 2 years) settled and survived. We can typically identify juvenile corals down to a size of ~0.5 cm. Table 4-2 summarizes site-level densities, as well as the number of scleractinian taxa observed as juveniles and the predominant species for each site. A total of 979 corals representing at least 30 scleractinian coral taxa were identified in quadrat surveys among the 43 sites. The range in mean juvenile densities was 0.96 to 8.01 per m^2. Although mean juveniles densities of less than 5 per m^2 were recorded at 35 of the 43 sites, the range among sites was within the range observed in the rest of the Florida Keys. There was no clear pattern among habitats or depths in terms of total juvenile coral densities (Figure 4-1). The greatest number of species encountered (10-11 coral taxa) occurred at two patchy hard-bottom sites south of the park and on the eastern Tortugas Bank. Greater juvenile densities (> 5 per m^2) were generally recorded from mid-depth (6-15) and deeper (15-21 m) low-relief or patchy hard-bottom on the Tortugas Bank, or medium-profile reefs at 15-21 m deep within DTNP (Figure 4-4). In contrast, deeper (15+ m) and higher-relief reef knoll and terrace habitats yielded low numbers of coral taxa and densities of juvenile corals.

Of the 979 juvenile corals identified and counted during 2008, four species comprised 71% of all juvenile corals encountered: *Siderastrea siderea* (228 juveniles, 23% of the total), *Porites astreoides* (202 juveniles, 21%), *Montastraea cavernosa* (154 juveniles, 16%), and *Stephanocoenia michelini* (108 juveniles, 11%). One or more of these species tended to dominant the juvenile assemblage at most of the

sites sampled during 2008 (Table 4-1). One pattern that is noteworthy is the predominance of broadcast spawning species dominating the juvenile coral assemblage, which may partly be a reflection of the depth of the habitats surveyed in the Tortugas region. Although *P. astreoides* dominates the juvenile coral assemblage in many habitats in the rest of the Florida Keys, and juveniles of *S. siderea* are abundant in the patch reef environment, the Tortugas region is clearly unique in terms of the relative abundance pattern.

Gorgonian density

Gorgonians were sampled in replicate 8-m x 1-m belt transect areas per site at all 43 Tortugas sites except site B223, where only one transect was sampled. A total of 7,896 colonies were recorded from surveys of 680 m2 of hard-bottom and coral reef habitat. Table 4-3 provides site-level densities and the dominant species for the 43 Tortugas sites sampled in 2008. Mean gorgonian densities tended to be greater on shallower (< 15 m) and lower relief sites, similar to surveys in previous years. Mean site-level densities of gorgonians ranged from 1.5 to 32.8 colonies per m^2 (Figure 4-1). Relatively high densities (> 20 colonies per m^2) were recorded from patch reefs previously dominated by staghorn coral (*Acropora cervicornis*), shallow (< 6 m) and deeper (6-15 m) hard-bottom areas, and shallow (< 6 m) medium-profile reefs within the park (Figure 4-5). Several of the deeper reef habitats (medium-profile reefs and reef terraces) in both DTNP and the Tortugas Bank had abundant encrusting gorgonians comprised of *Briareum asbestinum* and *Erythropodium caribaeorum*. Four species comprised nearly 50% of all gorgonians found among the 43 sites: *B. asbestinum* (1,181 colonies, 15% of the total), *E. caribaeorum* (690 colonies, 9%), *Plexaura flexuosa* (1,059 colonies, 13%), and the sea plumes *Pseudopterogorgia americana* (833 colonies, 11%), and *P. acerosa* (671 colonies, 9%). Areas near the southern extent of the park and the central Tortugas Bank are still relatively denuded relative to 1999-2000, but are recovering relative to 2006 after a series of tropical cyclones passed through the Tortugas region in 2005.

Figure 4-1. Mean (+ 1 SE) density (no. colonies/m^2) of corals and gorgonians in the Dry Tortugas region during May-June 2008. See Table 4-1 for habitat and depth designations.

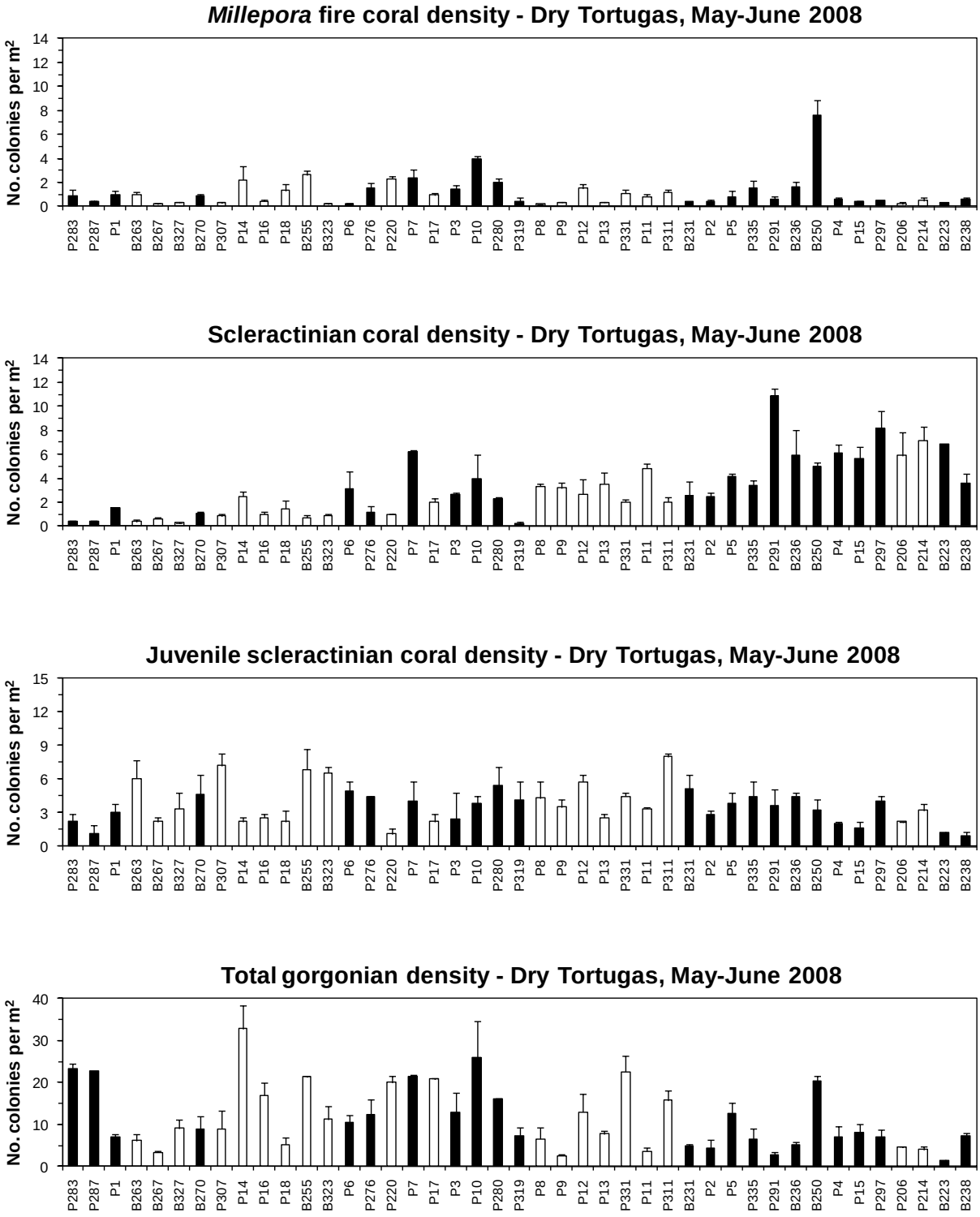


Figure 4-2. Spatial patterns of scleractinian coral density (no. colonies per m^2) from surveys of 43 sites in the Dry Tortugas region during May-June 2008. Data are based upon averages from surveys of two replicate 10-m^2 belt transects per site. Shown are the boundaries of the Research Natural Area (RNA) within DTNP, the Tortugas North Ecological Reserve, and the FKNMS.

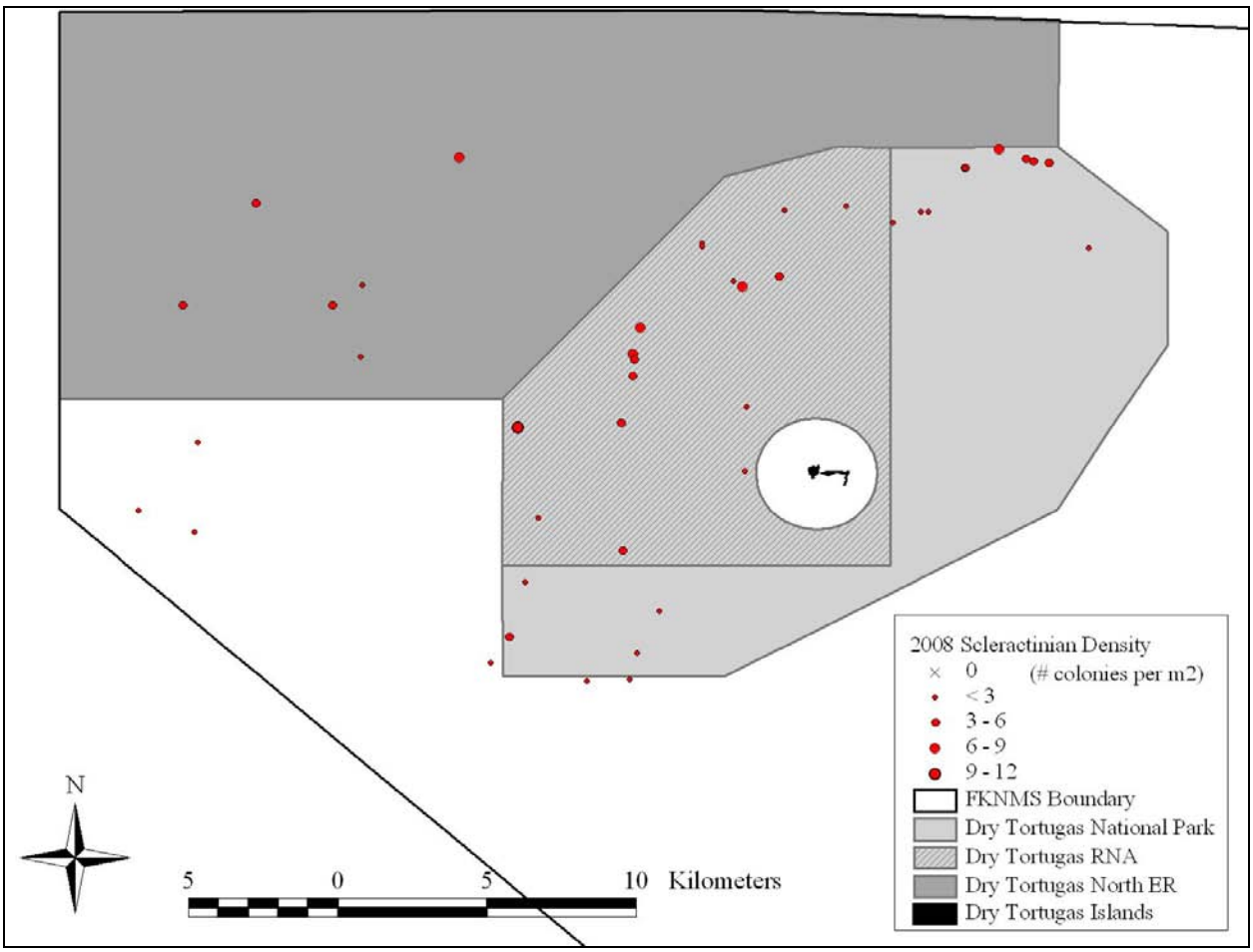


Figure 4-3. Disease-like symptoms, coral overgrowth, and predation on scleractinian reef corals in the Dry Tortugas region during May-June 2008.

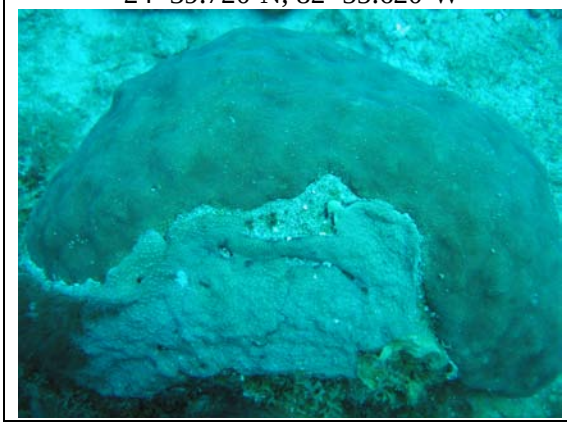
Siderastrea siderea – Site #5
Cliona delitrix boring, North-central DTNP
24° 41.226'N, 82° 52.999'W

Stephanocoenia michelini - Site #11
Snail predation, Southwestern DTNP
24° 34.708'N, 82° 57.882'W

Montastraea faveolata – Site #13
Black-band disease, Northeastern DTNP
24° 43.272'N, 82° 48.135'W

Siderastrea siderea – Site #14
Dark-spot syndrome, West of Pulaski Shoal
24° 42.386'N, 82° 50.297'W

Stephanocoenia michelini – Site #15
Gorgonian overgrowth, North of Loggerhead
24° 39.720'N, 82° 55.620'W



Montastraea faveolata – Site #223
White plague, Little Tortugas Bank
24° 43.371'N, 82° 58.772'W

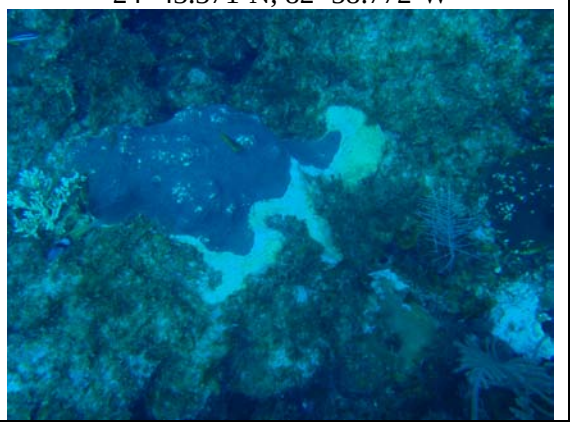


Figure 4-4. Spatial patterns of juvenile (< 4 cm max. diameter) scleractinian coral density (no. colonies per m^2) from surveys of 43 sites in the Dry Tortugas region during May-June 2008. Data are based upon averages from surveys of two replicate 3.12-m^2 belt transects per site. Shown are the boundaries of the Research Natural Area (RNA) within DTNP, the Tortugas North Ecological Reserve, and the FKNMS.

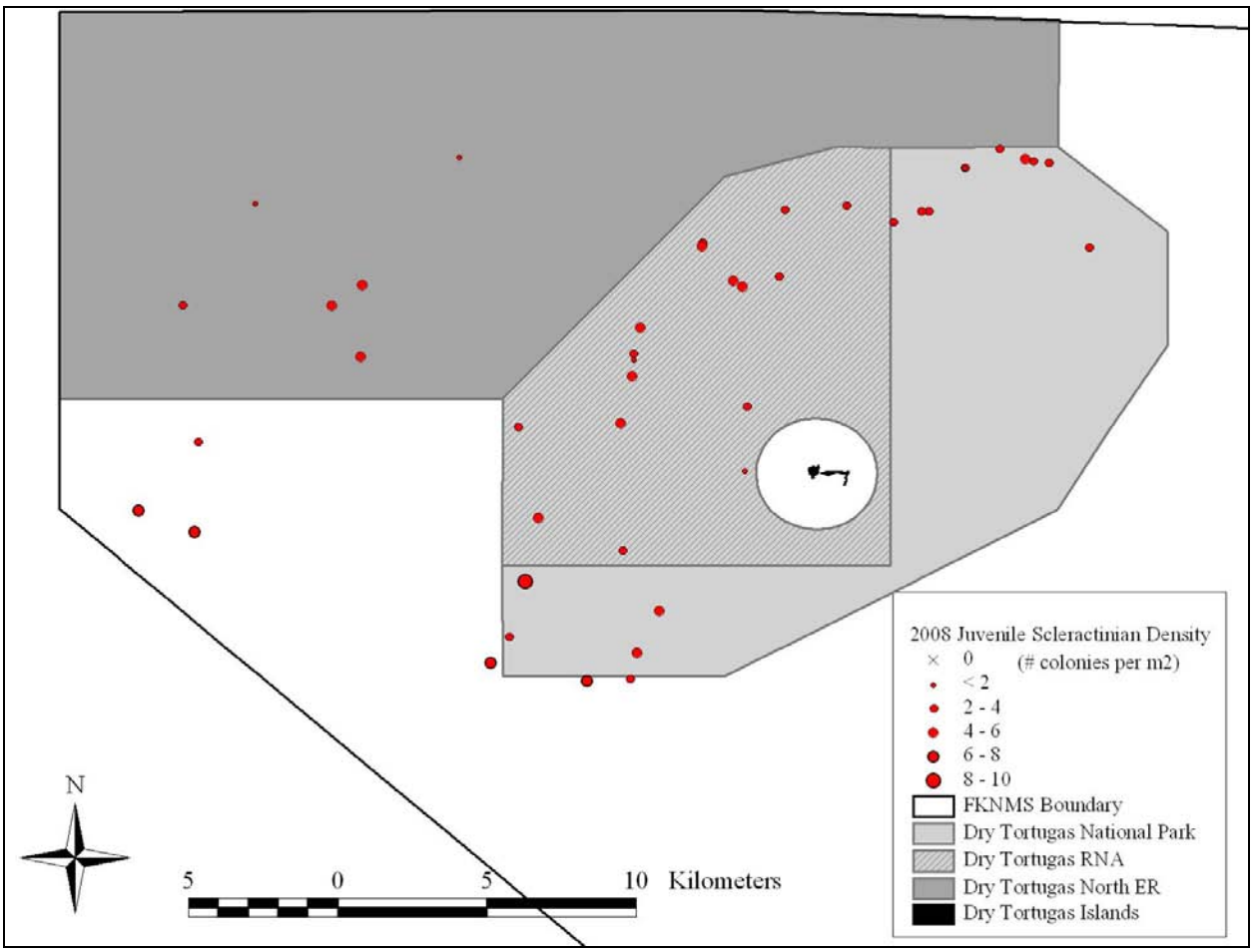


Figure 4-5. Spatial patterns of total gorgonian density (no. colonies per m^2) from surveys of 43 sites in the Dry Tortugas region during May-June 2008. Data are based upon averages from surveys of two replicate 8-m^2 belt transects per site. Shown are the boundaries of the Research Natural Area (RNA) within DTNP, the Tortugas North Ecological Reserve, and the FKNMS.

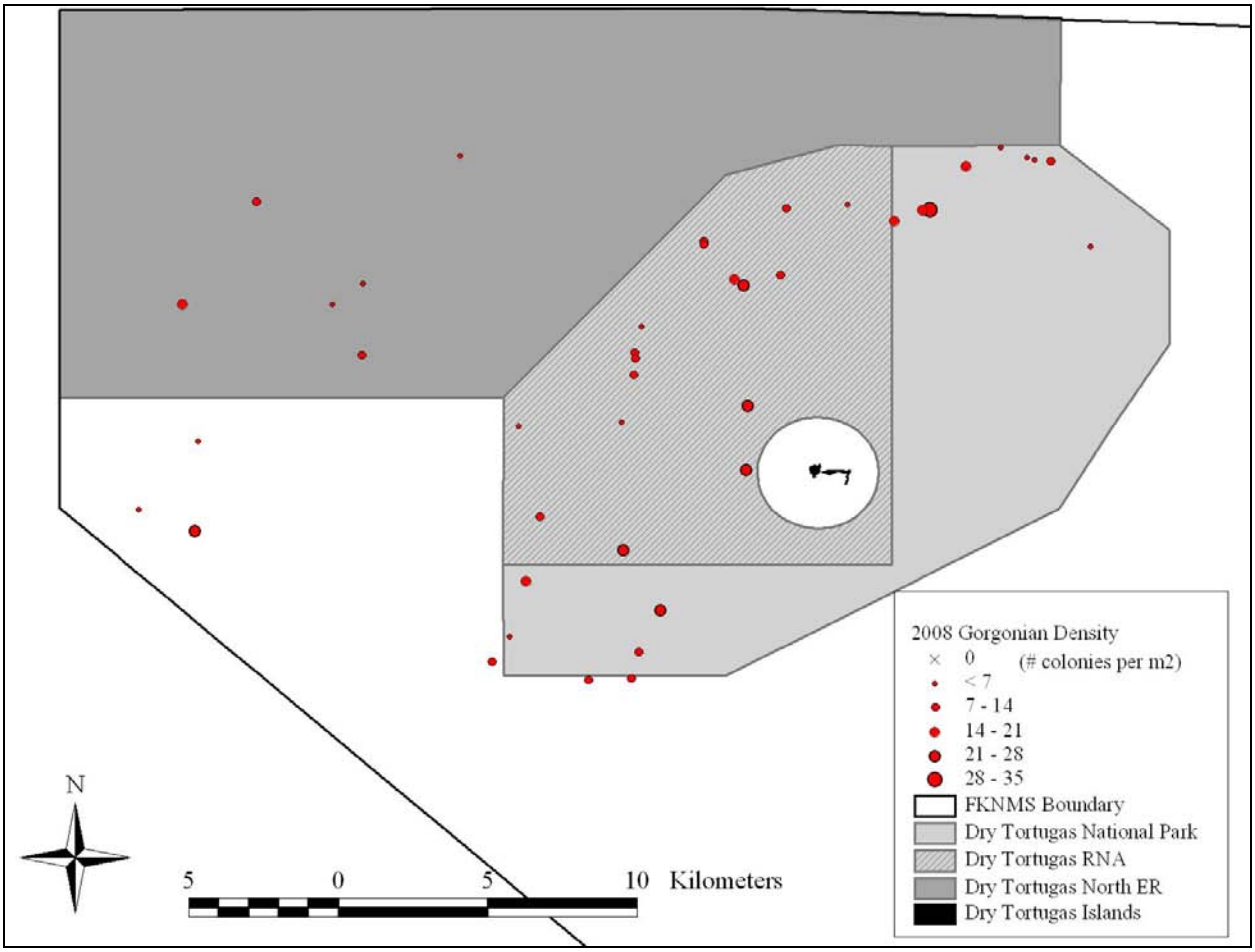


Table 4-1. Numbers of colonies (N) and mean ± 1 SE colony densities (no. per m^2) of milleporid hydrocorals, total scleractinian corals, and total stony corals in Dry Tortugas National Park (DTNP) and the Tortugas Bank, western Florida Keys National Marine Sanctuary (FKNMS). Data are based upon surveys of two 10-m x 1-m transects (20 m^2) per site at 43 sites during May-June 2008, except at sites P291 (12 m^2), B236 (17 m^2), B250 (14 m^2), P214 (18 m^2), P206 (16 m^2), P297 (16 m^2), and B223 (7 m^2). Sites are arranged by habitat and depth. Asterisked sites (**) are within the Research Natural Area (RNA) of DTNP or the Tortugas North Reserve of the FKNMS.

Site number/site location	*Millepora* spp.		Scleractinian corals		Total stony corals	
	N	No. per m^2	N	No. per m^2	N	No. per m^2
Staghorn patch reef (< 6 m)						
RNA – Dry Tortugas National Park						
P283 – NW DTNP (Marker 7)**	17	0.85 ± 0.55	8	0.40 ± 0.10	25	1.25 ± 0.65
P287 – West of Ft. Jefferson**	9	0.45 ± 0.05	8	0.40 ± 0.10	17	0.85 ± 0.15
Patchy hard-bottom (6-15 m)						
RNA – Dry Tortugas National Park						
P1 – NW of Texas Rock**	20	1.00 ± 0.30	31	1.55 ± 0.05	51	2.55 ± 0.25
Reference – FKNMS						
B327 – South of DTNP (East of "B" buoy)	7	0.35 ± 0.05	6	0.30 ± 0.00	13	0.65 ± 0.05
B267 – Tortugas Bank	4	0.20 ± 0.10	13	0.65 ± 0.05	17	0.85 ± 0.05
B263 – Tortugas Bank	20	1.00 ± 0.20	8	0.40 ± 0.20	28	1.40 ± 0.40
Patchy hard-bottom (15-21 m)						
Reference – FKNMS						
P307 – SW of DTNP (near “C” buoy)	6	0.30 ± 0.10	17	0.85 ± 0.15	23	1.15 ± 0.25
Tortugas North Ecological Reserve						
B270 – Eastern Tortugas Bank**	17	0.85 ± 0.15	22	1.10 ± 0.10	39	1.95 ± 0.05
Low-relief hard-bottom (< 6 m)						
Reference – Dry Tortugas National Park						
P18 – Eastern DTNP (O-72)	27	1.35 ± 0.55	29	1.45 ± 0.65	56	2.80 ± 1.20
P14 – West of Pulaski Shoal (O-12b)	44	2.20 ± 1.20	50	2.50 ± 0.40	94	4.70 ± 0.80
P16 – Northern DTNP (O-27)	9	0.45 ± 0.15	20	1.00 ± 0.20	29	1.45 ± 0.35
Low-relief hard-bottom (6-15 m)						
Reference – FKNMS						
B255 – Tortugas Bank (southern end)	53	2.65 ± 0.35	14	0.70 ± 0.20	67	3.35 ± 0.55
Low-relief hard-bottom (15-21 m)						
Reference – FKNMS						
B323 – South of DTNP (SW of "B" buoy)	4	0.20 ± 0.10	18	0.90 ± 0.10	22	1.10 ± 0.00
Low-relief spur and groove (6-15 m)						
Reference – Dry Tortugas National Park						
P220 – Northern DTNP (south of "J" buoy)	46	2.30 ± 0.20	20	1.00 ± 0.00	66	3.30 ± 0.20
RNA – Dry Tortugas National Park						
P276 – Northwestern DTNP**	31	1.55 ± 0.45	24	1.20 ± 0.50	55	2.75 ± 0.95
P6 – North of Loggerhead (I-38)**	4	0.20 ± 0.10	62	3.10 ± 1.50	66	3.30 ± 1.40
Medium-profile reef (< 6 m)						
Reference – Dry Tortugas National Park						
P17 – Northern DTNP (O-92)	19	0.95 ± 0.15	41	2.05 ± 0.25	60	3.00 ± 0.10
RNA – Dry Tortugas National Park						
P7 – NE of Loggerhead (I-26)**	47	2.35 ± 0.75	124	6.20 ± 0.10	171	8.55 ± 0.85
Medium-profile reef (6-15 m)						
RNA – Dry Tortugas National Park						
P3 – Northern DTNP (I-63)**	28	1.40 ± 0.40	54	2.70 ± 0.10	82	4.10 ± 0.30
P280 – Texas Rock**	40	2.00 ± 0.30	45	2.25 ± 0.15	85	4.25 ± 0.45

Site number/site location	*Millepora* spp.		Scleractinian corals		Total stony corals	
	N	No. per m^2	N	No. per m^2	N	No. per m^2
P10 – SE of Loggerhead (I-41)**	80	4.00 ± 0.20	80	4.00 ± 2.00	160	8.00 ± 2.20
P319 – SW of Loggerhead Reef**	9	0.45 ± 0.25	5	0.25 ± 0.15	14	0.70 ± 0.40
Reference – Dry Tortugas National Park						
P13 – Northeastern DTNP (O-56)	7	0.35 ± 0.05	70	3.50 ± 1.00	77	3.85 ± 0.95
P9 – Northeastern DTNP (O-94)	7	0.35 ± 0.05	64	3.20 ± 0.40	71	3.55 ± 0.35
P8 – Northeastern DTNP (O-82)	4	0.20 ± 0.00	67	3.35 ± 0.15	71	3.55 ± 0.15
P331 – East of SW Channel	22	1.10 ± 0.30	41	2.05 ± 0.15	63	3.15 ± 0.15
P12 – Southwestern DTNP (O-84)	30	1.50 ± 0.40	54	2.70 ± 1.20	84	4.20 ± 0.80
Medium-profile reef (15-21 m)						
Reference – Dry Tortugas National Park						
P311 – SW of Loggerhead Key	24	1.20 ± 0.20	41	2.05 ± 0.35	65	3.25 ± 0.55
P11 – Southwestern DTNP (O-42)	16	0.80 ± 0.20	97	4.85 ± 0.35	113	5.65 ± 0.55
Reference – FKNMS						
B231 – Tortugas Bank	8	0.40 ± 0.00	51	2.55 ± 1.15	59	2.95 ± 1.15
High-relief spur and groove (6-15 m)						
RNA – Dry Tortugas National Park						
P2 – Northern DTNP (I-36b)**	9	0.45 ± 0.15	49	2.45 ± 0.35	58	2.90 ± 0.20
P5 – North-central DTNP (I-44)**	16	0.80 ± 0.50	83	4.15 ± 0.25	99	4.95 ± 0.25
P335 – NW of Loggerhead Key**	31	1.55 ± 0.55	68	3.40 ± 0.40	99	4.95 ± 0.95
Reef knoll (15-21 m)						
RNA – Dry Tortugas National Park						
P291 – West of Loggerhead Key**	7	0.58 ± 0.25	131	10.92 ± 0.58	138	11.50 ± 0.33
Tortugas North Ecological Reserve						
B236 – Tortugas Bank**	29	1.62 ± 0.48	95	5.95 ± 2.05	124	7.57 ± 1.57
B250 – Cooper's Reef**	107	7.64 ± 1.21	70	5.00 ± 0.29	177	12.64 ± 1.50
Reef terrace (6-15 m)						
Reference – Dry Tortugas National Park						
P214 – Between "J" and "K" buoys	9	0.48 ± 0.23	131	7.15 ± 1.15	140	7.63 ± 1.38
P206 – NW of Pulaski Shoal	4	0.20 ± 0.20	102	5.90 ± 1.90	106	6.10 ± 2.10
Reef terrace (15-21 m)						
RNA – Dry Tortugas National Park						
P297 – West of Brilliant Shoal**	8	0.50 ± 0.00	130	8.13 ± 1.50	138	8.63 ± 1.50
P15 – North of Loggerhead (I-50)**	8	0.40 ± 0.10	112	5.60 ± 1.00	120	6.00 ± 1.10
P4 – North of Loggerhead (I-5b)**	13	0.65 ± 0.05	122	6.10 ± 0.70	135	6.75 ± 0.75
Reef terrace (22-27 m)						
Tortugas North Ecological Reserve						
B223 – Little Tortugas Bank**	2	0.29	48	6.86 ±	50	7.14
B238 – Sherwood Forest**	13	0.65 ± 0.05	72	3.60 ± 0.80	85	4.25 ± 0.85

Table 4-2. Numbers of species, juveniles, and mean ± 1 SE densities of juvenile (< 4 cm max. diameter) scleractinian corals in Dry Tortugas National Park (DTNP) and the Tortugas Bank, western Florida Keys National Marine Sanctuary (FKNMS). Data are based upon surveys of ten 0.65-cm x 0.48-cm quadrats sampled along each of two transects (6.24 m^2 per site) at 43 sites during May-June 2008 (except at P276 = 5.62 m^2, B231 = 5.93 m^2, B223 = 3.12 m^2). Sites are arranged by habitat and depth. Asterisked sites (**) are within the Research Natural Area (RNA) of DTNP or the Tortugas North Reserve of the FKNMS.

Site number/site location	Species	Juveniles	No. per m^2	Dominant species
Staghorn patch reef (< 6 m)				
RNA – Dry Tortugas National Park				
P283 – NW DTNP (Marker 7)**	6	14	2.24 ± 0.64	*D. strigosa* 21%, *F. fragum* 36%, *P. porites* 21%
P287 – West of Ft. Jefferson**	7	7	1.12 ± 0.80	*D. strigosa* 14%, *E. fastigiata* 14%, *M. areolata* 14%, *S. siderea* 14%, *S. michelini* 14%
Patchy hard-bottom (6-15 m)				
RNA – Dry Tortugas National Park				
P1 – NW of Texas Rock**	5	19	3.04 ± 0.80	*M. cavernosa* 21%, *P. astreoides* 47%, *S. michelini* 21%
Reference – FKNMS				
B327 – South of DTNP (East of "B" buoy)	6	21	3.37 ± 1.44	*S. radians* 14%, *S. siderea* 48%, *S. michelini* 14%
B267 – Tortugas Bank	7	14	2.24 ± 0.32	*P. astreoides* 21%, *S. radians* 14%, *S. siderea* 21%
B263 – Tortugas Bank	8	38	6.09 ± 1.60	*M. cavernosa* 37%, *P. astreoides* 11%, *S. siderea* 18%, *S. michelini* 11%
Patchy hard-bottom (15-21 m)				
Reference – FKNMS				
P307 – SW of DTNP (near "C" buoy)	11	45	7.21 ± 1.12	*M. cavernosa* 16%, *O. diffusa cavernosa* 11%, *S. siderea* 42%, *S. michelini* 11%
Tortugas North Ecological Reserve				
B270 – Eastern Tortugas Bank**	10	29	4.65 ± 1.76	*M. cavernosa* 10%, *P. astreoides* 14%, *S. siderea* 24%, *S. michelini* 21%
Low-relief hard-bottom (< 6 m)				
Reference – Dry Tortugas National Park				
P18 – Eastern DTNP (O-72)	3	14	2.24 ± 0.96	*P. astreoides* 64%, *S. radians* 29%
P14 – West of Pulaski Shoal (O-12b)	5	14	2.24 ± 0.32	*P. astreoides* 57%, *P. porites* 14%, *S. radians* 14%
P16 – Northern DTNP (O-27)	3	16	2.56 ± 0.32	*P. astreoides* 44%, *S. radians* 44%, *S. siderea* 13%
Low-relief hard-bottom (6-15 m)				
Reference – FKNMS				
B255 – Tortugas Bank (southern end)	7	43	6.89 ± 1.76	*M. cavernosa* 42%, *S. siderea* 37%
Low-relief hard-bottom (15-21 m)				
Reference – FKNMS				
B323 – South of DTNP (SW of "B" buoy)	9	41	6.57 ± 0.48	*M. cavernosa* 27%, *S. radians* 20%, *S. michelini* 27%
Low-relief spur and groove (6-15 m)				
Reference – Dry Tortugas National Park				

Site number/site location	Species	Juveniles	No. per m^2	Dominant species
P220 – Northern DTNP (south of "J" buoy)	6	7	1.12 ± 0.48	*M. areolata* 14%, *M. annularis* 14%, *P. astreoides* 14%, *P. porites* 14%, *S. siderea* 29%, *S. michelini* 14%
RNA – Dry Tortugas National Park				
P276 – Northwestern DTNP**	8	25	4.45 ± 0.04	*M. cavernosa* 16%, *P. astreoides* 32%, *S. radians* 20%, *S. siderea* 12%
P6 – North of Loggerhead (I-38)**	9	31	4.97 ± 0.80	*M. cavernosa* 16%, *P. astreoides* 23%, *P. porites* 23%, *S. siderea* 13%
Medium-profile reef (< 6 m)				
Reference – Dry Tortugas National Park				
P17 – Northern DTNP (O-92)	7	14	2.24 ± 0.64	*S. radians* 57%
RNA – Dry Tortugas National Park				
P7 – NE of Loggerhead (I-26)**	7	25	4.01 ± 1.76	*P. astreoides* 52%, *P. porites* 12%, *S. radians* 16%
Medium-profile reef (6-15 m)				
RNA – Dry Tortugas National Park				
P3 – Northern DTNP (I-63)**	5	15	2.40 ± 2.40	*M. cavernosa* 20%, *P. astreoides* 33%, *P. porites* 13%, *S. siderea* 13%, *S. michelini* 20%
P280 – Texas Rock**	7	34	5.45 ± 1.60	*M. cavernosa* 12%, *P. astreoides* 38%, *P. porites* 29%
P10 – SE of Loggerhead (I-41)**	5	24	3.85 ± 0.64	*M. cavernosa* 17%, *P. astreoides* 21%, *S. siderea* 50%
P319 – SW of Loggerhead Reef**	9	26	4.17 ± 1.60	*P. astreoides* 19%, *S. radians* 15%, *S. siderea* 35%
Reference – Dry Tortugas National Park				
P13 – Northeastern DTNP (O-56)	5	16	2.56 ± 0.32	*M. cavernosa* 14%, *P. astreoides* 63%, *S. radians* 13%, *S. michelini* 13%
P9 – Northeastern DTNP (O-94)	8	22	3.53 ± 0.64	*P. astreoides* 36%, *S. radians* 14%, *S. siderea* 14%
P8 – Northeastern DTNP (O-82)	6	27	4.33 ± 1.44	*P. astreoides* 52%, *S. siderea* 26%
P331 – East of SW Channel	7	28	4.49 ± 0.32	*M. cavernosa* 14%, *Scolymia* spp. 25%, *S. radians* 18%, *S. siderea* 25%, *S. michelini* 11%
P12 – Southwestern DTNP (O-84)	7	36	5.77 ± 0.64	*M. cavernosa* 31%, *P. astreoides* 22%, *S. siderea* 22%, *S. michelini* 17%
Medium-profile reef (15-21 m)				
Reference – Dry Tortugas National Park				
P311 – SW of Loggerhead Key	7	50	8.01 ± 1.32	*M. cavernosa* 26%, *P. astreoides* 10%, *S. siderea* 50%
P11 – Southwestern DTNP (O-42)	7	21	3.37 ± 0.16	*M. cavernosa* 14%, *Scolymia* spp. 14%, *S. siderea* 29%, *S. michelini* 24%
Reference – FKNMS				
B231 – Tortugas Bank	6	30	5.13 ± 1.28	*M. cavernosa* 33%, *S. siderea* 30%, *S. michelini* 27%
High-relief spur and groove (6-15 m)				
RNA – Dry Tortugas National Park				
P2 – Northern DTNP (I-36b)**	5	18	2.88 ± 0.32	*M. cavernosa* 22%, *P. astreoides* 33%, *S. siderea* 28%, *S. michelini* 11%
P5 – North-central DTNP (I-44)**	8	24	3.85 ± 0.96	*M. cavernosa* 21%, *P. astreoides* 33%, *S. siderea* 17%
P335 – NW of Loggerhead Key**	6	28	4.49 ± 1.28	*P. astreoides* 14%, *S. radians* 11%, *S. siderea* 43%, *S. michelini* 21%

Site number/site location	Species	Juveniles	No. per m^2	Dominant species
Reef knoll (15-21 m)				
RNA – Dry Tortugas National Park				
P291 – West of Loggerhead Key**	6	23	3.69 ± 1.44	*M. cavernosa* 17%, *S. radians* 17%, *S. siderea* 18%, *S. michelini* 13%
Tortugas North Ecological Reserve				
B236 – Tortugas Bank**	7	28	4.49 ± 0.32	*P. astreoides* 11%, *S. siderea* 46%, *S. michelini* 21%
B250 – Cooper's Reef**	6	20	3.21 ± 0.96	*A. agaricites* 15%, *M. cavernosa* 20%, *P. astreoides* 30%, *S. radians* 10%, *S. siderea* 20%
Reef terrace (6-15 m)				
Reference – Dry Tortugas National Park				
P214 – Between "J" and "K" buoys	6	20	3.21 ± 0.64	*A. agaricites* 10%, *P. astreoides* 55%, *P. porites* 15%, *S. michelini* 10%
P206 – NW of Pulaski Shoal	5	14	2.24 ± 0.00	*A. agaricites* 21%, *S. siderea* 14%
Reef terrace (15-21 m)				
RNA – Dry Tortugas National Park				
P297 – West of Brilliant Shoal**	9	25	4.01 ± 0.48	*S. radians* 24%, *S. siderea* 28%, *S. michelini* 24%
P15 – North of Loggerhead (I-50)**	8	10	1.60 ± 0.64	*A. agaricites* 10%, *M. decactis* 10%, *M. cavernosa* 10%, *M. ferox* 21%, *P. astreoides* 10%, *P. porites* 10%, *S. siderea* 20%, *S. michelini* 10%
P4 – North of Loggerhead (I-5b)**	6	13	2.08 ± 0.16	*M. cavernosa* 31%, *S. siderea* 31%
Reef terrace (22-27 m)				
Tortugas North Ecological Reserve				
B223 – Little Tortugas Bank**	2	4	1.28	*A. agaricites* 25%, *P. astreoides* 75%
B238 – Sherwood Forest**	4	6	0.96 ± 0.32	*A. agaricites* 33%, *P. astreoides* 33%, *S. radians* 17%, *S. michelini* 17%

Table 4-3. Numbers of colonies (N) and mean ± 1 SE colony densities (no. per m^2) for gorgonians in Dry Tortugas National Park (DTNP) and the Tortugas Bank, western Florida Keys National Marine Sanctuary (FKNMS). Data are based upon surveys of two 8-m x 1-m transects per site at 43 sites during May-June 2008 (except at site B223 = 8 m^2). Sites are arranged by habitat and depth. Asterisked sites (**) are within the Research Natural Area (RNA) of DTNP or the Tortugas North Reserve of the FKNMS.

Site number/site location	N	No. per m^2	Dominant species
Staghorn patch reef (< 6 m)			
RNA – Dry Tortugas National Park			
P283 – NW DTNP (Marker 7)**	373	23.31 ± 1.31	*P. acerosa* 55%, *P. americana* 20%
P287 – West of Ft. Jefferson**	363	22.69 ± 0.06	*P. flexuosa* 17%
Patchy hard-bottom (6-15 m)			
RNA – Dry Tortugas National Park			
P1 – NW of Texas Rock**	113	7.06 ± 0.69	*E. succinea* 12%, *G. ventalina* 14%, *P. flexuosa* 18%, *P. americana* 14%
Reference – FKNMS			
B327 – South of DTNP (East of "B" buoy)	147	9.19 ± 1.94	*M. elongata* 36%
B267 – Tortugas Bank	55	3.44 ± 0.19	*G. ventalina* 15%, *P. acerosa* 13%, *P. americana* 60%
B263 – Tortugas Bank	99	6.19 ± 1.56	*E. fusca* 13%, *G. ventalina* 10%, *P. acerosa* 18%, *P. americana* 29%
Patchy hard-bottom (15-21 m)			
Reference – FKNMS			
P307 – SW of DTNP (near "C" buoy)	145	9.06 ± 4.31	*E. caribaeorum* 28%, *E. fusca* 10%, *E. succinea* 13%
Tortugas North Ecological Reserve			
B270 – Eastern Tortugas Bank**	141	8.81 ± 3.06	*E. fusca* 16%, *E. succinea* 16%, *P. acerosa* 11%, *P. americana* 26%
Low-relief hard-bottom < 6 m)			
Reference – Dry Tortugas National Park			
P18 – Eastern DTNP O-72)	84	5.25 ± 1.75	*E. tourneforti* 14%, *G. ventalina* 26%, *P. flexuosa* 27%
P14 – West of Pulaski Shoal O-12b)	525	32.81 ± 5.69	*E. tourneforti* 23%, *P. flexuosa* 28%, *P. flagellosa* 12%
P16 – Northern DTNP O-27)	273	17.06 ± 2.81	*E. mammosa* 19%, *E. tourneforti* 21%, *P. flexuosa* 21%
Low-relief hard-bottom 6-15 m)			
Reference – FKNMS			
B255 – Tortugas Bank southern end)	342	21.38 ± 0.25	*M. elongata* 12%, *P. americana* 30%
Low-relief hard-bottom 15-21 m)			
Reference – FKNMS			
B323 – South of DTNP SW of "B" buoy)	180	11.25 ± 3.13	*M. elongata* 28%, *P. flexuosa* 10%, *P. americana* 13%
Low-relief spur and groove 6-15 m)			
Reference – Dry Tortugas National Park			
P220 – Northern DTNP south of "J" buoy)	322	20.13 ± 1.50	*E. fusca* 13%, *E. succinea* 19%, *P. flexuosa* 21%, *P. americana* 19%
RNA – Dry Tortugas National Park			
P276 – Northwestern DTNP**	198	12.38 ± 3.63	*E. fusca* 16%, *E. succinea* 14%, *G. ventalina* 11%, *P. flexuosa* 11%
P6 – North of Loggerhead I-38)**	169	10.56 ± 1.81	*B. asbestinum* 91%
Medium-profile reef < 6 m)			
Reference – Dry Tortugas National Park			
P17 – Northern DTNP O-92)	334	20.88 ± 0.13	*E. tourneforti* 14%, *P. flexuosa* 41%

Site number/site location	N	No. per m^2	Dominant species
RNA – Dry Tortugas National Park			
P7 – NE of Loggerhead I-26)**	344	21.50 ± 0.38	*G. ventalina* 20%, *P. flexuosa* 36%, *P. homomalla* 10%
Medium-profile reef 6-15 m)			
RNA – Dry Tortugas National Park			
P3 – Northern DTNP I-63)**	205	12.81 ± 4.69	*B. asbestinum* 31%, *E. succinea* 17%, *P. flexuosa* 20%
P280 – Texas Rock**	257	16.06 ± 0.31	*E. succinea* 15%, *G. ventalina* 16%, *P. flexuosa* 16%, *P. americana* 20%
P10 – SE of Loggerhead I-41)**	418	26.13 ± 8.50	*B. asbestinum* 9%, *E. caribaeorum* 8%, *P. bipinnata* 37%
P319 – SW of Loggerhead Reef**	118	7.38 ± 1.88	*G. ventalina* 13%, *P. flexuosa* 20%, *P. americana* 21%
Reference – Dry Tortugas National Park			
P13 – Northeastern DTNP O-56)	125	7.81 ± 0.69	*E. caribaeorum* 14%, *E. fusca* 43%, *E. succinea* 10%, *P. flexuosa* 22%, *P. americana* 12%
P9 – Northeastern DTNP O-94)	42	2.63 ± 0.38	*B. asbestinum* 83%, *E. caribaeorum* 14%
P8 – Northeastern DTNP O-82)	105	6.56 ± 2.81	*B. asbestinum* 56%, *E. caribaeorum* 39%
P331 – East of SW Channel	362	22.63 ± 3.88	*E. caribaeorum* 14%, *E. succinea* 11%, *M. flavida* 11%, *P. flexuosa* 18%
P12 – Southwestern DTNP O-84)	207	12.94 ± 4.44	*E. caribaeorum* 12%, *E. fusca* 16%, *E. succinea* 11%, *P. flexuosa* 15%
Medium-profile reef 15-21 m)			
Reference – Dry Tortugas National Park			
P311 – SW of Loggerhead Key	252	15.75 ± 2.25	*B. asbestinum* 18%, *E. caribaeorum* 27%, *E. succinea* 12%, *P. flexuosa* 11%
P11 – Southwestern DTNP O-42)	59	3.69 ± 0.81	*E. caribaeorum* 20%, *P. flexuosa* 27%, *P. acerosa* 15%
Reference – FKNMS			
B231 – Tortugas Bank	80	5.00 ± 0.38	*B. asbestinum* 38%, *E. caribaeorum* 34%, *E. succinea* 11.3%
High-relief spur and groove 6-15 m)			
RNA – Dry Tortugas National Park			
P2 – Northern DTNP I-36b)**	72	4.50 ± 2.00	*B. asbestinum* 13%, *E. caribaeorum* 29%, *E. succinea* 17%, *G. ventalina* 15%, *P. flexuosa* 13%
P5 – North-central DTNP I-44)**	203	12.69 ± 2.44	*B. asbestinum* 45%, *G. ventalina* 13.8%, *P. flexuosa* 11%
P335 – NW of Loggerhead Key**	106	6.63 ± 2.38	*B. asbestinum* 12%, *E. caribaeorum* 58%, *P. americana* 16%
Reef knoll 15-21 m)			
RNA – Dry Tortugas National Park			
P291 – West of Loggerhead Key**	44	2.75 ± 0.63	*B. asbestinum* 18%, *E. caribaeorum* 18%, *P. acerosa* 27.3%, *P. americana* 25%
Tortugas North Ecological Reserve			
B236 – Tortugas Bank**	84	5.25 ± 0.50	*B. asbestinum* 13%, *E. caribaeorum* 32%, *E. succinea* 12%, *P. acerosa* 14%, *P. americana* 23%
B250 – Cooper's Reef**	325	20.31 ± 1.31	*B. asbestinum* 31%, *E. caribaeorum* 13%, P. acerosa 44%, *P. americana* 11%
Reef terrace 6-15 m)			
Reference – Dry Tortugas National Park			
P214 – Between "J" and "K" buoys	66	4.13 ± 0.63	*B. asbestinum* 58%, *E. caribaeorum* 35%
P206 – NW of Pulaski Shoal	73	4.56 ± 0.31	*B. asbestinum* 77%, *E. caribaeorum* 23%
Reef terrace 15-21 m)			
RNA – Dry Tortugas National Park			
P297 – West of Brilliant Shoal**	111	6.94 ± 1.94	*B. asbestinum* 59%, *E. caribaeorum* 39%

Site number/site location	N	No. per m^2	Dominant species
P15 – North of Loggerhead I-50)**	131	8.19 ± 2.06	*B. asbestinum* 92%
P4 – North of Loggerhead I-5b)**	114	7.13 ± 2.38	*B. asbestinum* 75%, *P. acerosa* 16%
Reef terrace 22-27 m)			
Tortugas North Ecological Reserve			
B223 – Little Tortugas Bank**	12	1.50	*B. asbestinum* 50%, *E. caribaeorum* 17%, *P. acerosa* 17%
B238 – Sherwood Forest**	118	7.38 ± 0.50	*B. asbestinum* 44%, *P. acerosa* 41%