The following supplement accompanies the article

Population dynamics of corkscrew sea anemones *Bartholomea annulata* in the Florida Keys

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Supplement. Map of study sites and information on population parameters.

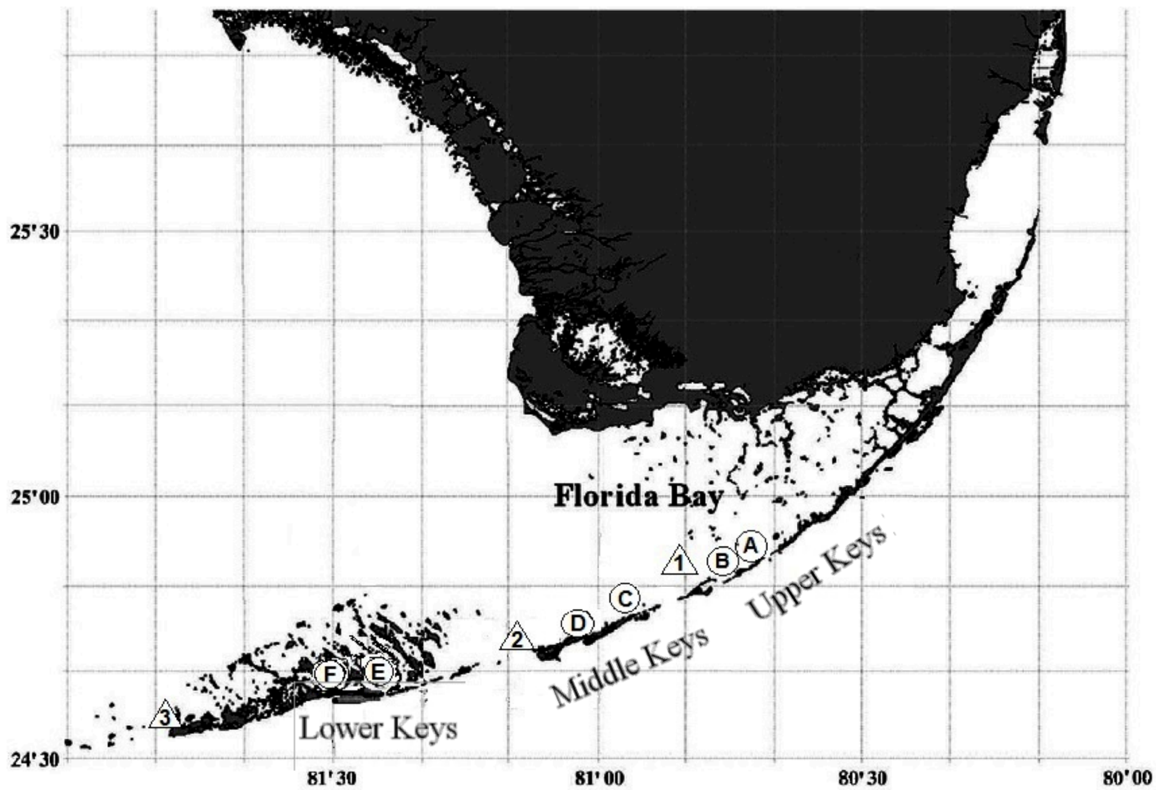

Fig. S1. Map of the Florida Keys, USA, showing the locations of 6 study sites (shown as letters inside circles) examined for population characteristics of corkscrew sea anemones *Bartholomea annulata*, and of 3 NOAA weather buoys (shown as numbers inside triangles) used to calculate seawater temperature within each of 3 regions containing the study sites (Upper, Middle, and Lower Keys). All study sites were located in nearshore areas along the Florida Bay side of the Keys. See text for definitions used to classify high vs. low human impact sites. (A) Upper Keys High-impact site (Indian Channel), on rocky boulders at 1 m depth between 2 marinas, near cars parked along a wide shoulder adjacent to Interstate Highway 1, with boat traffic and swimmers in the water. (B) Upper Keys Low-impact site (Robbies), near the highway on rocky boulders at 1 m depth, adjacent to a narrow shoulder with no parked cars, dense plant growth along the shore that prevented easy water access, and no swimmers in the water. (C) Middle Keys Low-impact site (Quarry), 2 m depth on small coral patches, ~1 km off the highway on a dirt road, in an area listed on signage as prohibited to the public by the Marathon Police and Fire Departments; accessible by boat, but fishing boats rarely observed there. (D) Middle Keys High-impact site (Tiki Hut), a frequently-used public boat ramp, with the survey area at 2-3 m deep along the rock rubble edge of the boat ramp where people fished and boats entered the water. (E) Lower Keys High-impact site (Bowman's Channel), ~ 1-3 m deep on sand and boulder patches, with many lobster traps and fishing debris in the water, as well as fishing boats and parked cars adjacent to the site. (F) Lower Keys Low-impact site (Cudjoe), on coral rubble adjacent to a deserted boat ramp <1 m deep at low tide; not deep enough for boat access, no people observed at the site, and listed on signage as closed to the public by the Florida Department of Law Enforcement. The 3 NOAA weather buoys (http://www.ndbc.noaa.gov/) were: (1) Upper Keys buoy (Buoy LONF1, ~20 km SSW of both Upper Keys sites), (2) Middle Keys buoy (Buoy VCAF1, ~10 km WSW of both Middle Keys sites), and (3) Lower Keys buoy (Buoy KYWF1, ~25 km SSW of both Lower Keys sites)

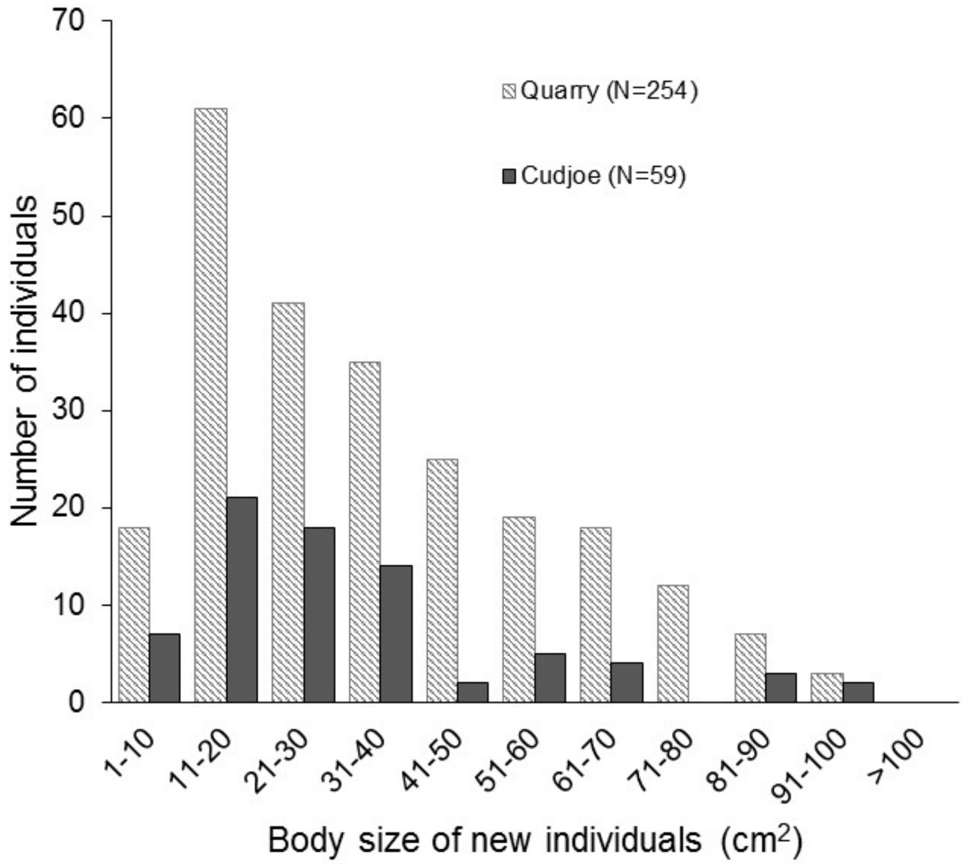

Fig. S2. Size frequencies of individuals that joined populations (either by recruitment or immigration) of *Bartholomea annulata* over 1 y at 2 sites in the Florida Keys: Quarry and Cudjoe. Note that most of the new individuals were < 50 cm^2 tentacle crown surface area. Individuals < 50 cm^2 were considered to be recruits, while larger individuals were considered to be immigrants

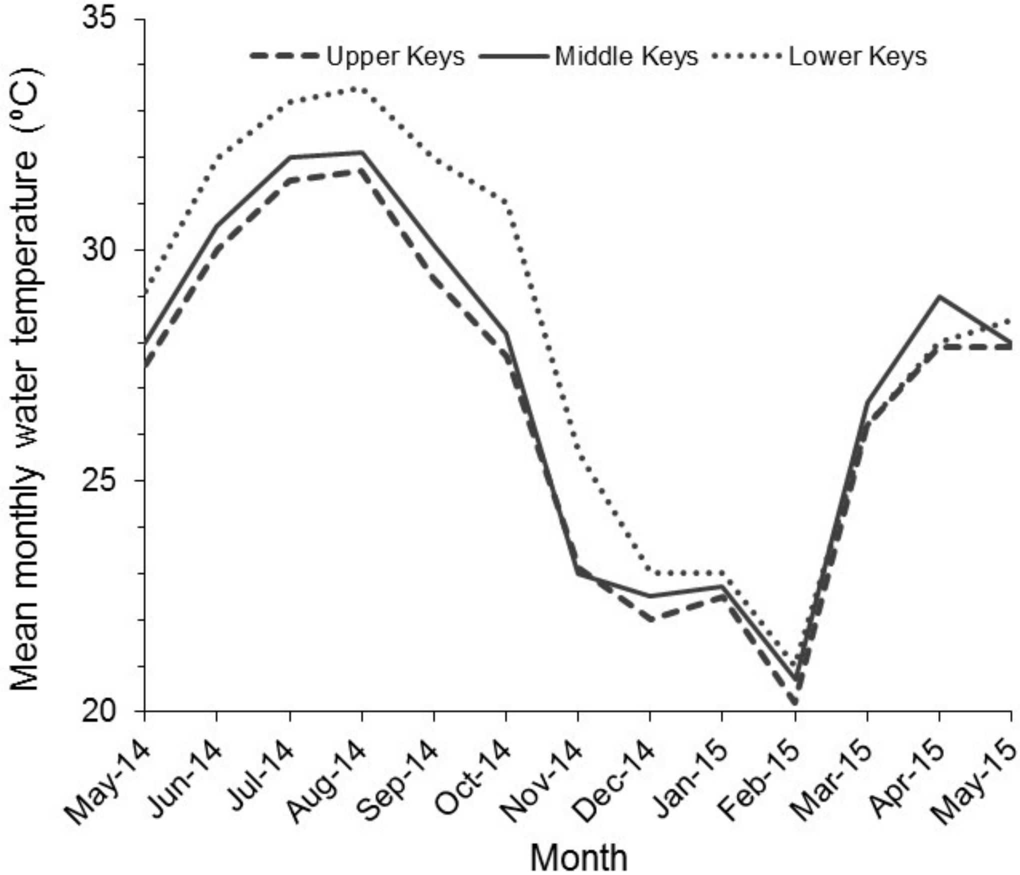

Fig. S3. Sea surface water temperatures (ºC) from NOAA buoys near study sites, in each of 3 examined regions in the Florida Keys (Upper, Middle, Lower)

Table S1. Elasticity values for population transitions of corkscrew sea anemones *Bartholomea annulata* at 2 sites (Quarry and Cudjoe) in the Florida Keys, each 2 mo during May 2014 – May 2015. Elasticity matrices were calculated using the equation $e_{ij} = a_{ij}/\lambda \times \partial\lambda / \partial a_{ij}$, where e_{ij} = elasticity of the (i,j) entry of the size-based matrix, $a_{ij} = (i,j)$ transition probability in the matrix, and λ = population growth. Values in bold indicate the transitions with the highest elasticity values during each time step, corresponding to the transitions that had the greatest effect on intrinsic rates of population change (λ), shown as bolded cells in Table 2. *Cudjoe was not surveyed in Nov 2014 due to a storm; transition values between Sept 2014 and Jan 2015 were interpolated

A. Quarry

	May – July 2014			July – Sept 2014			Sept – Nov 2014			Nov 2014 – Jan 2015			Jan – Mar 2015			Mar – May 2015		
	I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
I	0.18	0.07	0.06	0.01	0.00	0.03	0.03	0.02	0.02	0.04	0.04	0.03	0.01	0.00	0.02	0.02	0.01	0.02
II	0.08	0.12	0.12	0.02	0.07	0.10	0.02	0.10	0.14	0.05	0.07	0.15	0.01	0.01	0.01	0.02	0.11	0.07
III	0.04	0.14	**0.20**	0.01	0.12	**0.65**	0.02	0.14	**0.52**	0.03	0.16	**0.43**	0.01	0.02	**0.92**	0.01	0.08	**0.65**

B. Cudjoe

	May – July 2014			July – Sept 2014			Sept – Nov 2014*			Nov 2014 – Jan 2015*			Jan – Mar 2015			Mar - May 2015		
	I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
I	**0.40**	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.04	0.02	0.00	0.00	0.03	0.00	0.00	0.02
II	0.14	0.21	0.03	0.00	0.00	0.00	0.00	0.03	0.02	0.05	0.14	0.05	0.02	0.06	0.07	0.02	0.04	0.13
III	0.00	0.06	0.03	0.00	0.00	**1.00**	0.00	0.02	**0.94**	0.00	0.07	**0.57**	0.01	0.09	**0.71**	0.00	0.15	**0.64**

Table S2. Demographic characteristics of corkscrew sea anemones *Bartholomea annulata* at 2 sites (Quarry and Cudjoe) in the Florida Keys, each 2 mo during May 2014 – May 2015. Size-based transition matrices were used to calculate λ, the intrinsic rate of population change and ϱ, the damping ratio. Transition matrices and therefore λ analysis did not include effects of recruitment, thus λ values < 1 indicated declining populations without recruitment. Transition probabilities were bootstrapped 1000 times to create confidence intervals for λ and ϱ. λ_{1000} and ϱ_{1000} show mean values (and 95% confidence intervals in parentheses) based on the bootstrapped transition matrices; λ_{sample} and ϱ_{sample} show values from the transition matrices based on the population data.

	λ		ϱ	
Site and Date	λ_{1000}	λ_{sample}	ϱ_{1000}	ϱ_{sample}
A. Quarry				
May – July 2014	0.91 (0.64-1.19)	0.91	0.79 (0.15-2.44)	0.51
July – Sept 2014	0.93 (0.39-1.50)	0.96	2.53 (0.00-7.34)	0.38
Sept – Nov 2014	0.76 (0.42-1.10)	0.77	0.57 (0.04-1.96)	0.09
Nov 2014 – Jan 2015	0.65 (0.41-0.90)	0.64	0.23 (0.05-0.62)	0.08
Jan – Mar 2015	0.68 (0.30-1.11)	0.73	0.38 (0.01-1.35)	0.03
Mar – May 2015	0.82 (0.42-1.28)	0.81	0.55 (0.00-2.47)	0.08
B. Cudjoe				
May – July 2014	0.87 (0.48-1.26)	0.84	0.79 (0.00-3.14)	0.35
July – Sept 2014	0.88 (0.39-1.46)	0.90	0.81 (0.00-6.83)	0.10
Sept 2014 – Jan 2015	0.75 (0.30-1.26)	0.85	0.56 (0.00-3.11)	0.14
Jan – Mar 2015	0.67 (0.27-1.10)	0.75	0.37 (0.00-1.32)	0.05
Mar – May 2015	0.64 (0.11-1.17)	0.67	0.32 (0.00-2.10)	0.02

Table S3. Population turnover rates and times of corkscrew sea anemones *Bartholomea annulata* each 2 mo at 2 sites in the Florida Keys, calculated from mortality, recruitment, and abundance. T = turnover rate per 2 mo period. T_{time} = time required for complete replacement of individuals (in months). Recruits listed here included all individuals who entered the populations regardless of body size, to allow accurate estimation of turnover rates. See text for details

	Event					
Site and Date	**Start**	**Lost**	**Recruited**	**Remain**	***T* =**	**T_{time} =**
A. Quarry						
May – July 2014	97	12	13	98	0.13	15.60
July – Sept 2014	98	8	57	147	0.27	7.54
Sept – Nov 2014	147	35	66	178	0.31	6.44
Nov 2014 – Jan 2015	178	61	35	152	0.29	6.95
Jan – Mar 2015	152	48	36	140	0.29	6.95
Mar – May 2015	140	25	47	162	0.24	8.40
			Turnover time (T_{time}) = 8.65 ± 3.47 mo ($\bar{x}$ ± SD)			
B. Cudjoe						
May – July 2014	62	8	14	68	0.17	11.82
July – Sept 2014	68	7	17	78	0.16	12.17
Sept 2014 – Jan 2015	78	16	17	79	0.21	9.52
Jan – Mar 2015	79	23	6	62	0.20	9.72
Mar – May 2015	62	21	5	46	0.24	8.31
			Turnover time (T_{time}) = 10.31 ± 1.64 mo ($\bar{x}$ ± SD)			