Text S1. Experimental design

Each 2 × 2 m^2 pen was constructed from PVP plastic grillage (10 mm gap), 45 cm in height, adjoined to 30 cm of mesh that sat on the seafloor outside the pen, forming a vertical L shape. Metal re-bars were placed in each corner of the pen to provide tension and concrete blocks were placed on the perpendicular mesh, weighing down the grillage to the seafloor on the outside of the pens to avoid damage to the seagrass inside. Pens were constructed a week prior to the start of the experiment. Previous experiments indicated that other animals such as fish, crustaceans, urchins and other echinoderms were not excluded from the cages and that there was no sedimentation along fences caused by possible hydrodynamics changes in water flow.

Table S1: Weight (g) and number of individual *H. scabra* animals included in each experimental treatment pen.

	Site A		**Site B**		**Site C**		**Site D**	
	Medium density	High density	Medium density	High density	Medium density	High density	Medium density	High density
	52	92	74	114	114	100	121	122
	48	150	70	130	46	45	38	33
	77	70	47	46	104	116	38	32
	61	56	46	64	39	40	106	35
	60	69	65	46	42	77	103	65
	52	39	115	51	41	31	41	130
	57	50	50	131	44	34	32	119
	35	47	52	54	37	140	31	33
	40	55	44	106	40	62	92	30
	33	150	36	59	62	137		35
	85	88		40	30	31		135
		37		50		143		140
		38		136		37		123
		140		49		47		31
		115		31		36		34
				60		44		93
				33		36		16
						44		
Total (g)	600	1196	599	1200	599	1200	602	1206
# of H. scabra	11	15	10	17	11	18	9	17

Test S2. Elemental and particle size analysis

Sediment samples were analysed for total organic carbon (C_{org} %) content using an organic elemental analyser (Carlo Erba NA 2500, Eager 300 software). Prior to analysis, sediment samples were dried at 50 °C for 48 hours, crushed to a fine powder using a pestle and mortar. Due to the presence of carbonates, samples were then de-calcified to remove all inorganic carbon prior to analysis. Between 15 to 20 mg of each sample was weighed out into a silver capsules which are less susceptible to corrosion during acid treatments (12.5 mm x 8 mm). The acidification procedure involved the addition of 30 μL of deionised water followed by the addition 20 μL (2 × 10 μL aliquots) of 2M HCl to the samples. Samples were heated at 40 °C for 24 hours and the process was repeated until there was no visible reaction for two consecutive additions of the HCl. Silver capsules were then closed and wrapped in tin capsules (8 mm × 5 mm) to promote complete combustion in the analyser.

Particle size was measured using a Beckman-Coulter LS 230 laser particle size analyser, equipped with a fluid module. Prior to analysis, samples were dried at 50 °C for 48 hours and sieved through a 1 mm sieve into glass vials. Samples were then quartered to give a representative sample and weighed into 250 ml glass beakers (~1.3 g). 50 ml of 4 % sodium hexametaphosphate was then added to the samples, cleaned in a GT Sonic ultrasonic bath for 15 minutes and then analysed. Median values were used to present and analyse data.