Supplemental Material

Table S1. Mean and standard error (± SE) of the decay constant k (d^{-1}) and percent dry mass remaining (%DMR) for *Agarophyton vermiculophyllum* (n = 6) and *Spartina alterniflora* (n = 5) wrack that was experimentally placed on the sediment surface or buried. Average %DMR is presented for each of three collection days: 10, 20, and 30. r^2 represents the mean, standard error (± SE), and range of r^2 values for the linear regressions used to calculate k (d^{-1}) from ln(%DMR) across days per treatment combination. See Fig. 1 for representation of significant differences for %DMR.

Species	Deposition	Decay Constant (k d^{-1})		% DMR - Day 10		% DMR - Day 20		% DMR - Day 30		r^2		
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Range
Agarophyton	Surface	0.067	0.010	53.57	2.34	26.29	3.53	17.09	4.33	0.89	0.04	0.72 – 0.99
	Buried	0.105	0.016	20.24	2.09	11.66	3.42	6.46	2.26	0.82	0.07	0.60 – 0.99
Spartina	Surface	0.023	0.002	63.93	1.32	51.12	1.41	49.92	3.55	0.83	0.06	0.60 – 0.96
	Buried	0.023	0.002	52.62	2.29	47.82	1.57	48.88	4.2	0.65	0.06	0.46 – 0.75

Table S2. Analysis of deviance tables of the (a) overall model and (b) post-hoc pairwise comparisons for univariate generalized linear models for individual invertebrate taxa that colonized wrack treatments across collection days. Fixed effects included wrack species (*Agarophyton vermiculophyllum* [n = 10], *Spartina alterniflora* [n = 9], and control [n = 10]) and day collected (day 5 and 10). The control treatment consisted of an empty litter bag. Final wrack biomass (g DW) was included as a covariate to account for differences in final biomass observed among wrack treatments. Data were analyzed using the 'mvabund' package in R. For the overall model (a), significance was evaluated with $\alpha = 0.05$, with **bold** indicating a significant difference ($p \leq 0.05$) and *italics* indicating a trend ($0.05 < p < 0.10$). For post hoc pairwise comparisons (b), we used a Bonferroni correction, leading to an alpha value of 0.017 ($\alpha = 0.05/3$); for these, **bold** indicates significant differences ($p \leq 0.017$) and *italics* indicates trends ($0.017 < p < 0.033$).

a) Overall Effect ($\alpha = 0.05$)

	Ampithoe valida		*Gammarus mucronatus*		Xanthidae (Juvenile)		Xanthidae (Megalopae)		*Alitta succinea*		*Edotea* sp.		Polychaeta (Other)		*Tritia obsoleta*		Gastropoda (Larvae)	
	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p
Wrack Treatment	**46.242**	**0.001**	**33.531**	**0.001**	**24.648**	**0.001**	**18.498**	**0.001**	**22.984**	**0.001**	2.521	0.747	1.019	0.809	1.842	0.785	6.625	0.180
Day Collected	**10.618**	**0.019**	0.346	0.852	0.318	0.852	0.760	0.798	**9.581**	**0.027**	**8.074**	**0.044**	**7.961**	**0.044**	*6.316*	*0.092*	2.656	0.419
Wrack*Day	7.557	0.211	1.541	0.853	5.924	0.320	1.287	0.819	6.064	0.320	2.470	0.730	0	0.924	0	0.924	0.410	0.819
Wrack Biomass (g DW)	4.230	0.376	1.632	0.823	0.068	0.965	0.422	0.903	0.926	0.855	1.264	0.853	1.058	0.855	2.265	0.738	0.033	0.965

b) Post-Hoc Pairwise Comparisons (α = 0.017)

Agarophyton* vs. *Spartina

	Ampithoe valida		*Gammarus mucronatus*		Xanthidae (Juvenile)		Xanthidae (Megalopae)		*Alitta succinea*		*Edotea* sp.		Polychaeta (Other)		*Tritia obsoleta*		Gastropoda (Larvae)	
	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p
Wrack Treatment	0.422	0.947	0.772	0.947	0.119	0.947	0.935	0.947	0.288	0.947	0.528	0.947	0.953	0.947	1.185	0.949	2.011	0.810
Day Collected	7.994	0.064	1.413	0.583	0.009	0.919	0.582	0.684	**12.087**	**0.008**	5.529	0.156	4.905	0.174	4.854	0.184	2.656	0.374
Wrack*Day	5.936	0.143	0.074	0.828	2.686	0.546	1.249	0.729	1.176	0.729	2.259	0.586	0	0.828	0	0.821	0.410	0.770
Wrack Biomass (g DW)	3.498	0.502	0.634	0.941	0.015	0.972	0.382	0.941	0.449	0.941	0.949	0.922	1.273	0.895	2.239	0.759	0.033	0.977

***Agarophyton* vs. Control**

	Ampithoe valida		*Gammarus mucronatus*		Xanthidae (Juvenile)		Xanthidae (Megalopae)		*Alitta succinea*		*Edotea* sp.		Polychaeta (Other)		*Tritia obsoleta*		Gastropoda (Larvae)	
	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p
Wrack Treatment	**42.830**	**0.001**	**23.569**	**0.001**	**18.099**	**0.001**	**10.768**	**0.004**	**22.498**	**0.001**	0.825	0.844	0.701	0.844	0	0.967	6.072	0.062
Day Collected	3.030	0.519	0.031	0.878	2.560	0.519	2.004	0.519	8.758	0.045	2.890	0.519	4.531	0.323	2.773	0.509	1.725	0.509
Wrack*Day	1.973	0.561	0.098	0.818	2.743	0.491	0.618	0.818	6.160	0.095	0.738	0.818	0	0.881	0	0.896	0	0.896
Wrack Biomass (g DW)	2.683	0.591	3.023	0.588	0.014	0.996	1.838	0.693	0.037	0.996	0.005	0.996	0.302	0.927	1.691	0.686	0.642	0.914

***Spartina* vs. Control**

	Ampithoe valida		*Gammarus mucronatus*		Xanthidae (Juvenile)		Xanthidae (Megalopae)		*Alitta succinea*		*Edotea* sp.		Polychaeta (Other)		*Tritia obsoleta*		Gastropoda (Larvae)	
	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p	Dev	p
Wrack Treatment	**27.364**	**0.001**	**26.049**	**0.001**	**16.790**	**0.001**	**17.863**	**0.001**	**12.871**	**0.002**	2.677	0.390	0.021	0.871	1.185	0.625	1.555	0.561
Day Collected	**12.345**	**0.008**	0.240	0.958	0.027	0.980	0.010	0.980	0.544	0.931	**9.835**	**0.017**	6.493	0.086	4.854	0.164	1.272	0.871
Wrack*Day	0.679	0.567	2.484	0.340	4.411	0.196	0.390	0.567	2.564	0.340	0	0.914	0	0.914	0	0.905	0.001	0.737
Wrack Biomass (g DW)	5.050	0.289	0.662	0.811	0.307	0.814	0.037	0.842	3.347	0.515	3.836	0.483	2.267	0.615	1	0.840	2.663	0.600

Table S3. Mean density of invertebrates that colonized wrack treatments across collected days. Densities were calculated as the average number of individuals that colonized each litter bag divided by the remaining dry biomass (g DW) of the respective wrack treatments. Wrack treatments included *Agarophyton vermiculophyllum* (n = 10), *Spartina alterniflora* (n = 9), and a control (n = 10). The control treatment consisted of an empty litterbag. Litterbags were collected on days 5 and 10 to assess colonization over time. To allow for better visualization and to account for the lack of wrack biomass present in the controls, for calculations, 1 g DW was added to remaining dry biomass for all wrack treatments. See Table S2 for statistical differences. Median densities are presented in Fig. 4.

Day Collected	Wrack Treatment	*Ampithoe valida*		*Gammarus mucronatus*		Xanthidae (Juvenile)		Xanthidae (Megalopae)		*Alitta succinea*	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Five	Control	0.4	0.22	0.6	0.43	0	0	0.3	0.15	0.2	0.13
	Agarophyton	4.75	1.07	2.52	0.99	0.61	0.19	0.6	0.12	0.25	0.09
	Spartina	2.34	0.77	0.72	0.18	0.52	0.12	0.27	0.07	0.15	0.08
Ten	Control	0	0	0.2	0.13	0.3	0.3	0.2	0.13	0	0
	Agarophyton	3.93	1.12	4.43	2.49	1.38	0.39	0.5	0.26	1.2	0.22
	Spartina	0.52	0.19	1.46	0.37	0.35	0.16	0.34	0.11	0.4	0.1

Day Collected	Wrack Treatment	*Edotea* sp.		Polychaeta (Other)		*Tritia obsoleta*		Gastropoda (Larvae)	
		Mean	SE	Mean	SE	Mean	SE	Mean	SE
Five	Control	0.2	0.13	0	0	0	0	0	0
	Agarophyton	0.14	0.11	0	0	0	0	0.14	0.08
	Spartina	0.15	0.06	0	0	0	0	0.02	0.02
Ten	Control	0	0	0.3	0.21	0.1	0.1	0	0
	Agarophyton	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.05
	Spartina	0	0	0.08	0.06	0.09	0.07	0	0

a)

b)

Figure S1. a) Diptych of the experimental site located along the Wilmington River at the Skidaway Institute of Oceanography on Skidaway Island, Georgia, USA. Experimental blocks were placed 0.5 m into the *Spartina alterniflora* stand from the mudflat edge. b) Non-native seaweed *Agarophyton vermiculophyllum* deposited within the edge of a *S. alterniflora* stand at a nearby site.