

Appendix S1

Article: Topography and disturbance influence trait-based composition and productivity of adjacent habitats in a coastal system

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Methods for species composition analysis

Non-metric multidimensional scaling (NMDS) was used to investigate variation of species cover among community types. Bray-Curtis distance measure was used to calculate a distance matrix for species-based analysis. Ordinations were run (max. iteration of 999) with 3-dimensions to a minimized stress value (stress value < 0.2). Ordinations were performed in R (R Core Team, v. 3.5.0, 2018) using the vegan package. For interpretation, a PCA rotation was performed on each NMDS (first two axes represent maximum variation). Pearson correlation coefficients were calculated to facilitate interpretation of multivariate patterns.

Difference in species composition among habitat types were tested using multiple response permutation procedure (MRPP; $\alpha = 0.05$). Pairwise tests were performed to determine which habitat types differed in species composition (PC-ORD; Bonferroni adjusted $\alpha = 0.008$).

Table S1. Coordinates of traits in multivariate space (NMDS 1 and NMDS 2) and correlation coefficients (r^2) values from envfit model (Fig.3). Asterisks on r^2 values represent significance ($P < 0.05$).

Trait	NMDS 1	NMDS 2	r^2
Height (cm)	0.785	0.619	0.38*
Specific leaf area (g cm ⁻²)	-0.585	-0.811	0.40*
Leaf nitrogen content (% N)	-0.980	0.199	0.69*
Leaf carbon content (% C)	-0.280	0.960	0.06
Leaf $\delta^{13}\text{C}$	-0.999	0.059	0.64*
Leaf C:N	0.999	-0.045	0.62*
Root tissue density (g cm ⁻³)	-0.417	-0.909	0.48*
Specific root length (g m ⁻²)	0.290	0.957	0.51*
Root nitrogen content (% N)	-0.672	0.741	0.63*
Root carbon content (% C)	-0.398	-0.918	0.23*
Root $\delta^{13}\text{C}$	-0.931	0.364	0.45*
Root C:N	0.446	-0.895	0.66*

Table S2. Pairwise comparison of MRPP results on species- and trait-based community composition differences between community types on Hog and Metompkin Island. Bold indicates significance with Bonferroni corrected $\alpha = 0.008$.

Community type comparison	T	P
Hog dune – Hog swale	-6.10	<0.0001
Hog dune – Metompkin dune	-6.07	<0.0001
Hog dune – Metompkin swale	-3.06	0.0115
Hog swale – Metompkin dune	-10.20	<0.0001
Hog swale – Metompkin swale	-6.07	<0.0001
Metompkin dune – Metompkin swale	-2.54	0.0218

Table S3. Species Pearson correlation coefficients for 3-dimensional NMDS solution (Fig. 3)

Species	NMDS 1	NMDS 2	NMDS 3
<i>Achillea millefolium</i>	-0.000	-0.005	0.104
<i>Ammophila breviligulata</i>	0.149	-0.279	-0.454
<i>Andropogon virginicus</i>	0.073	0.213	0.489
<i>Baccharis halimifolia</i>	0.019	-0.172	0.334
<i>Borrichia frutescens</i>	-0.434	-0.029	0.049
<i>Cakile edentula</i>	0.095	-0.141	-0.319
<i>Carex lurida</i>	0.079	0.017	0.152
<i>Cenchrus tribuloides</i>	0.031	0.109	-0.093
<i>Chenopodium ambrosioides</i>	0.097	-0.116	-0.219
<i>Cirsium horridulum</i>	0.003	0.078	-0.143
<i>Conyza canadensis</i>	0.243	0.258	-0.032
<i>Cyperus esculentes</i>	0.255	0.555	-0.000
<i>Distichlis spicata</i>	-0.544	0.069	0.044
<i>Eragrostis spectabilis</i>	0.125	-0.582	-0.061
<i>Fimbristylis castanea</i>	-0.283	-0.028	-0.126
<i>Gnaphalium purpureum</i>	0.112	-0.346	-0.016
<i>Hypericum gentianoides</i>	-0.040	0.097	-0.011
<i>Iva frutescens</i>	-0.209	-0.061	-0.017
<i>Juncus gerardi</i>	-0.055	-0.04	0.358
<i>Krigia virginica</i>	0.125	-0.029	-0.201
<i>Lepidium virginicum</i>	0.020	0.014	-0.093
<i>Limonium carolinianum</i>	-0.479	0.075	-0.029
<i>Linum virginianum</i>	-0.002	-0.088	0.235
<i>Morella cerifera</i>	-0.059	-0.163	0.459
<i>Monarda punctata</i>	-0.009	0.075	-0.162
<i>Oenothera humifusa</i>	0.170	-0.078	0.129
<i>Panicum amarum</i>	0.249	0.194	-0.228
<i>Panicum dichotomiflorum</i>	0.210	-0.034	0.129
<i>Phragmites australis</i>	0.135	-0.160	0.353
<i>Pseudognaphalium obtusifolium</i>	0.025	-0.144	-0.036
<i>Rumex acetosella</i>	0.122	0.219	-0.078
<i>Salicornia depressa</i>	-0.479	0.002	-0.161
<i>Schoenoplectus americanus</i>	-0.056	0.121	-0.023
<i>Setaria parviflora</i>	-0.047	0.033	0.097
<i>Solidago sempervirens</i>	0.328	-0.033	0.097
<i>Spartina alterniflora</i>	-0.528	0.127	-0.014
<i>Spartina patens</i>	-0.278	0.272	-0.064
<i>Strophostyles helvola</i>	-0.034	0.021	-0.107

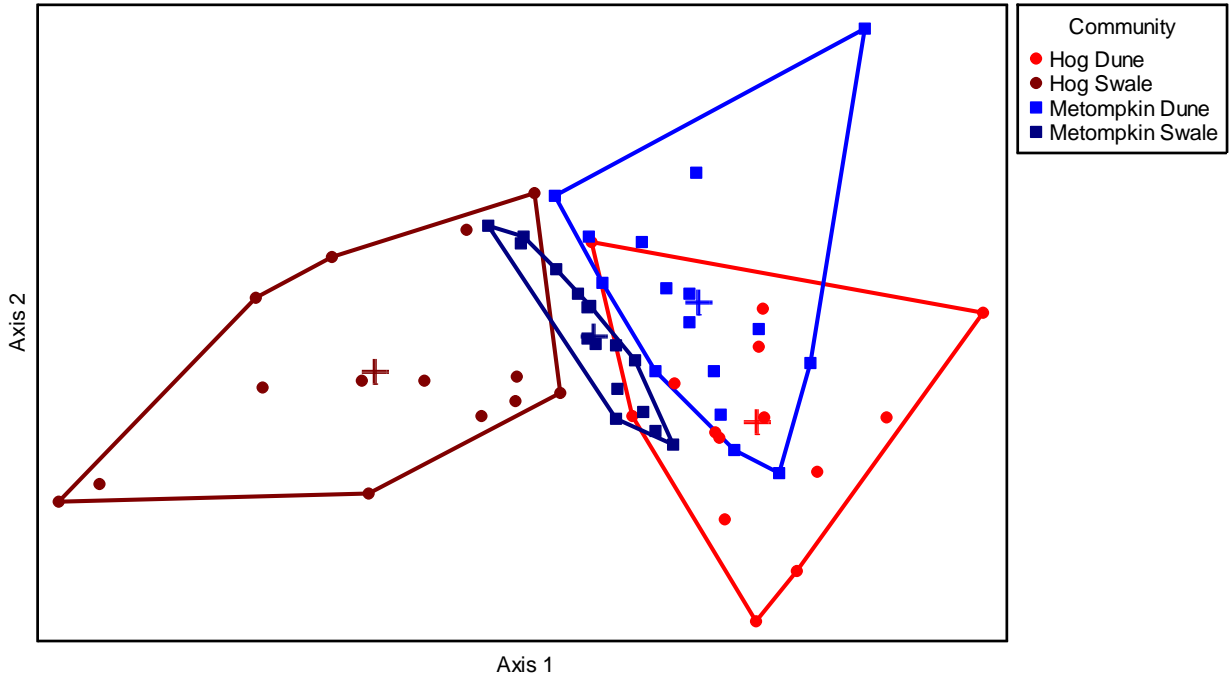


Figure S1. Principle Components Analysis (PCA) of environmental variables (elevation, distance to shoreline, and soil salinity). Axes 1 and 2 explained 82.2% of the total variation (PC1 = 60.7%, PC2 = 21.5%). Colors and convex hulls highlight groups based on habitat type.

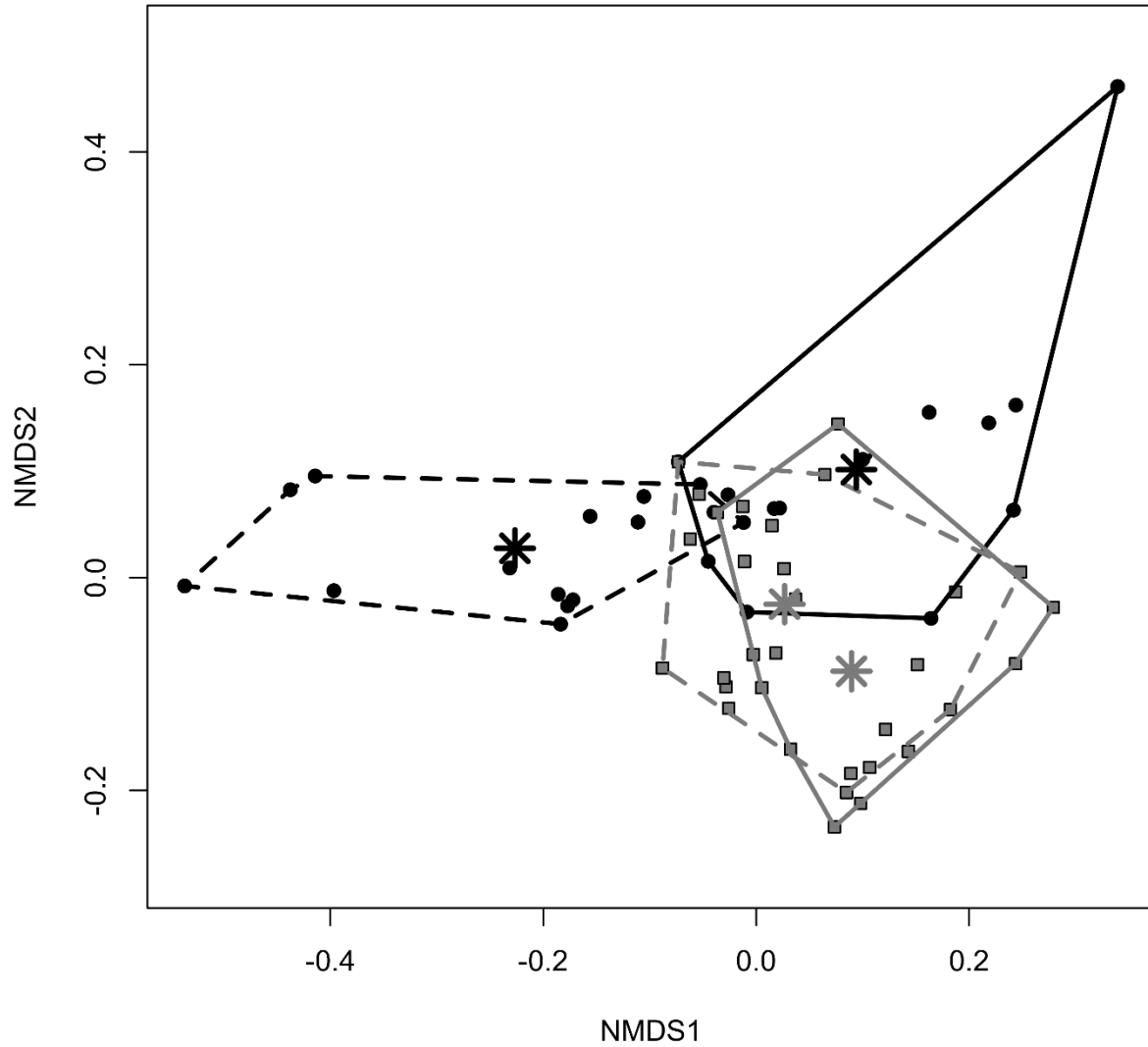


Figure S2. Non-metric multidimensional scaling of species-based community composition grouped by habitat type. Black circles represent plots located on Hog Island and gray squares represent plots on Metompkin Island. Solid lines group plots on each island defined as dune habitats, while dotted lines group plots on each island defined as swale habitats. Asterisks represent centroids for each habitat with colors matched to island association. Convex hulls cluster habitat types for each island, with centroids for each habitat type providing a measure of “mean” species composition for each community.