Table S1: Number of samples collected in Tampa Bay by Bay Segment and Year. From 2007 onward, LTB+MTB and MR+TCB (samples boxed for both combinations) were treated as two, instead of four, reporting units for random sample selection by the EPCHC. Additional samples were collected in 2010 in OTB for a special project (highlighted in grey). Decimal ratios were calculated by continuously dividing every number within a year by the number to its right; for a given year, the quotient of HB and OTB was divided by MTB, whose quotient was divided by LTB, and so on. A decimal ratio of 1 would indicate equal sampling effort across bay segments. Abbreviations follow those outlined in Section 2.

	HB	OTB	MTB	LTB	MR	TCB	BCB	Bay-Wide	Decimal Ratio
1993	19	17	20	17	11	7	0	91	
1994	19	17	20	17	10	7	0	90	
1995	29	23	21	22	11	7	21	134	1.69 x 10^-6
1996	27	15	24	24	13	8	21	132	1.43 x 10^-6
1997	22	16	22	21	13	8	21	123	1.36 x 10^-6
1998	26	16	20	17	13	7	21	120	2.50 x 10^-6
1999	23	19	21	19	13	8	21	124	1.39 x 10^-6
2000	22	19	23	17	13	8	27	129	1.05 x 10^-6
2001	25	18	26	12	9	5	23	118	4.30 x 10^-6
2002	25	8	21	9	7	4	9	83	6.56 x 10^-5
2003	28	9	22	12	7	3	10	91	5.61 x 10^-5
2004	25	9	22	11	10	1	10	88	1.15 x 10^-4
2005	24	10	22	11	6	5	10	88	3.31 x 10^-5
2006	24	8	19	8	5	5	9	78	8.77 x 10^-5
2007	9	7	7	1	5	4	10	43	9.18 x 10^-4
2008	9	7	5	3	6	3	11	44	4.33 x 10^-4
2009	9	7	6	2	5	4	11	44	4.87 x 10^-4
2010	9	22	5	3	5	4	11	59	1.24 x 10^-4
2011	9	7	5	3	7	2	11	44	5.57 x 10^-4
2012	9	7	5	3	7	2	11	44	5.57 x 10^-4
2013	9	6	5	3	6	3	11	43	5.05 x 10^-4
2014	9	7	5	3	5	4	11	44	3.90 x 10^-4
2015	9	7	5	3	6	3	11	44	4.33 x 10^-4

Table S2: Model calibration metrics between observed values and model predicted values. Cells highlighted in blue indicate that those values are not present in the graphs of Figures 4 and S3. **Apparent (not corrected for optimism) statistics reported.

	Pearson Correlation	Spearman Rank Correlation	Slope	Intercept	Root Mean Square Error	Average Error
Capitella capitata						
Poisson	-0.06	0.37	1.03	-0.05	7.72E+18	6.25E+17
Negative Binomial	0.18	0.40	0.40	0.78	-815.58	-61.30
Tweedie	0.11	0.40	0.76	0.35	-133.54	32.04
Zero-Inflated Poisson	-0.11	0.26	-7.54E-08	1.54	-3.64E+83	-1.04E+82
Hurdle	0.31	0.40	0.95	0.04	-40.01	0.41
Boosted Regression Tree	0.15	0.39	1.44	-0.57	7.76	2.21
*Capitella aciculata***						
Poisson	1.00	0.31	1.01	0.00	0.05	0.01
Negative Binomial	0.05	0.14	0.03	0.12	5.09	0.52
Tweedie	0.21	0.14	0.79	0.05	2.66	0.21
Zero-Inflated Poisson	0.00	-0.01	-5.12E-08	0.13	75038.91	2211.73
Hurdle	0.00	0.08	-5.00E-08	0.13	126014.15	6087.10
Boosted Regression Tree	0.09	0.08	238.71	-30.81	2.71	0.26
Capitella jonesi						
Poisson	-0.22	0.09	2.04	-0.15	1.96	0.25
Negative Binomial	-0.05	0.14	0.47	0.07	1.55	0.35
Tweedie	-0.21	0.10	0.97	0.01	1.55	0.26
Zero-Inflated Poisson	-0.02	0.02	-1.04E-09	0.14	3.23E+06**	8.82E+282
Hurdle	0.06	0.17	0.51	0.06	-2.52E+09	2.49E+07
Boosted Regression Tree	0.00	0.10	4.30	-0.36	1.70	0.24
Heteromastus filiformis						
Poisson	0.02	0.32	1.11	-0.06	2.50**	2.99E+177
Negative Binomial	0.15	0.34	0.21	0.36	7.62E+05	-2.25E+04
Tweedie	0.03	0.33	0.81	0.10	-1.20E+06	2.14E+04

Zero-Inflated Poisson	0.40	0.30	0.98	-0.02	-4.01E+108	-1.36E+107
Hurdle	0.35	0.34	1.01	-0.01	-5.15E+05	-2.38E+04
Boosted Regression Tree	0.30	0.30	1.25	-0.10	3.99	0.81
Mediomastus ambiseta						
Poisson	0.13	0.24	1.20	-0.31	8.06**	1.46E+167
Negative Binomial	0.30	0.28	0.98	0.26	10.80	2.27
Tweedie	0.36	0.27	1.30	-0.19	10.98	2.27
Zero-Inflated Poisson	0.33	0.25	0.65	0.45	10.64**	-7.60E+301
Hurdle	0.03	0.11	0.12	1.25	10.71	3.03
Boosted Regression Tree	0.37	0.22	1.28	-0.32	11.49	2.27
Mediomastus californiensis						
Poisson	-0.03	0.23	1.32	-0.24	4.96E+27	1.79E+24
Negative Binomial	0.10	0.25	0.54	0.35	3.65	1.41
Tweedie	0.04	0.24	0.94	0.07	4.80	1.34
Zero-Inflated Poisson	0.00	0.19	0.00	0.76	20.21**	4.37E+241
Hurdle	0.07	0.15	0.72	0.15	-15.98	2.11
Boosted Regression Tree	0.12	0.20	1.64	-0.41	5.43	1.30

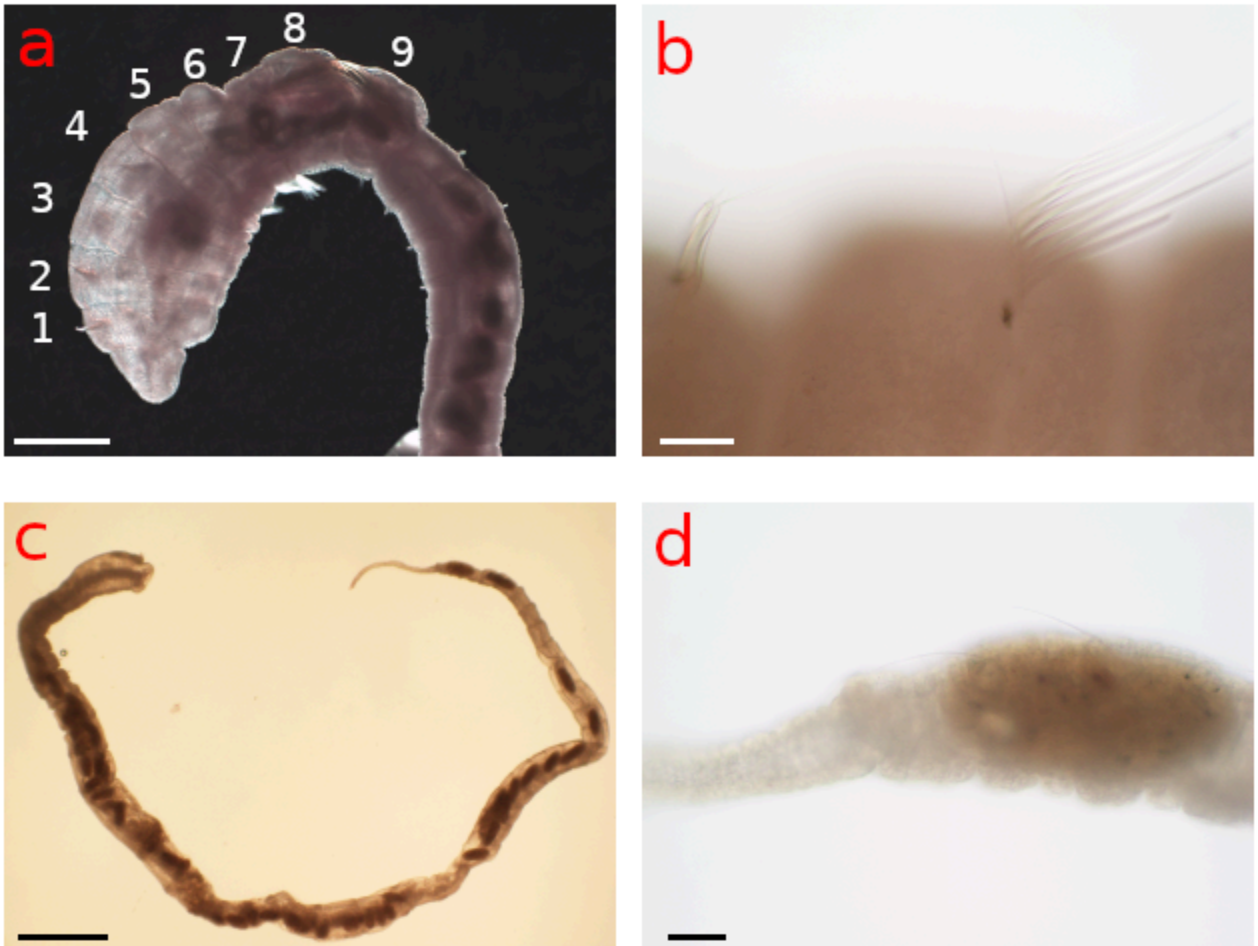
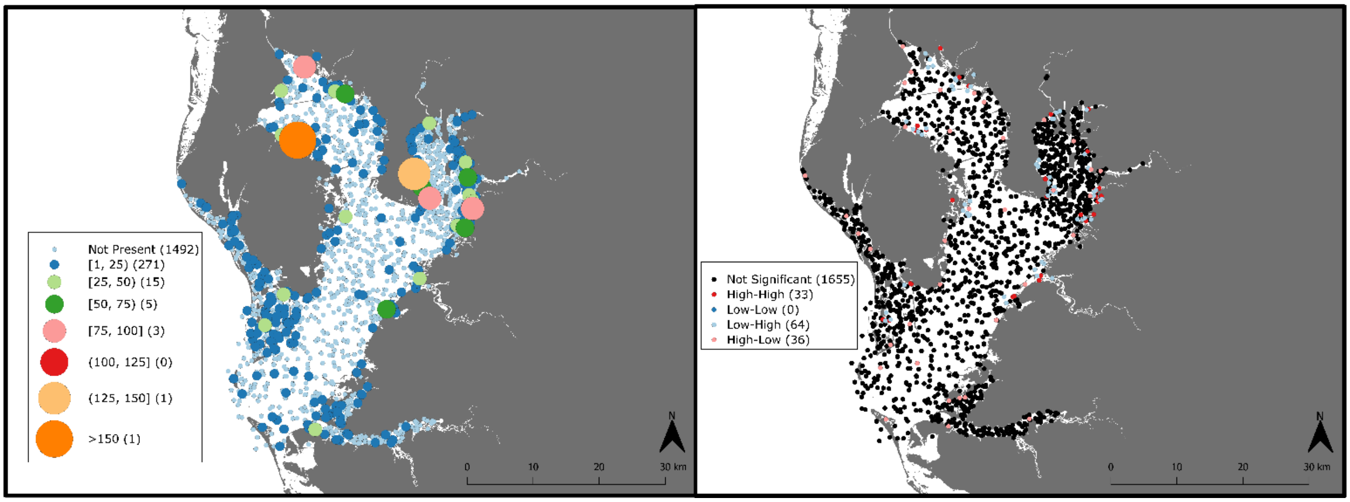
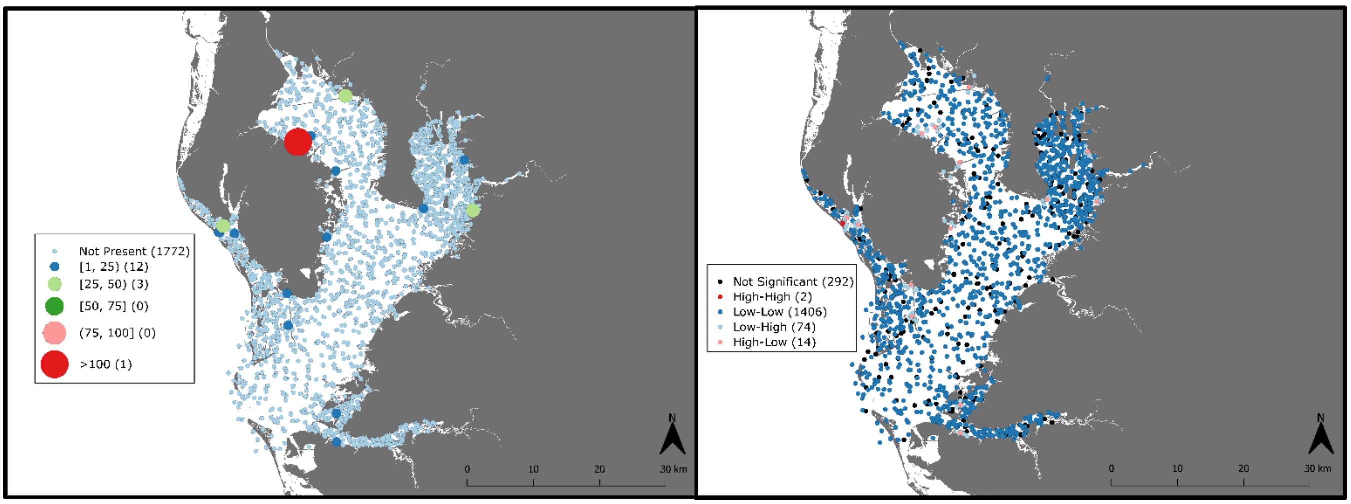


Figure S1: Light micrographs of Capitellidae species highlighting diagnostic characters. All specimens are from the Hillsborough County Environmental Protection Commission's samples and were photographed in-house. Capitellids are characterized by having thoracic and abdominal regions, with the number of thoracic chaetigers being the primary diagnostic for genera. The arrangement and type(s) of chaetae are also important. (a): *Capitella aciculata* specimen with thoracic chaetigers 1-9 labeled to differentiate thorax from abdomen. (b): Acicular spines (left) and capillary chaetae (right) of the specimen in (a). (c): *Mediomastus ambiseta* specimen with the caudal appendage visible at the posteriot end. (d): Posterior end of the specimen in (c) with the caudal appendage (left) and long, capillary chaetae (top) visible. Scale bars: A&C=300 microns; B=100 microns; D=20 microns.

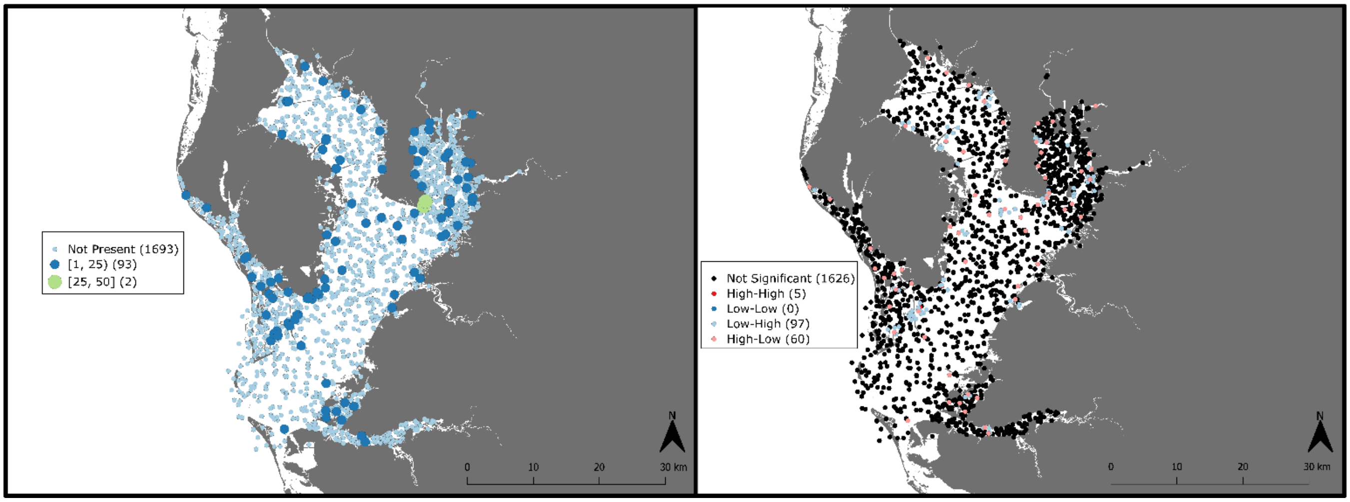
Capitella capitata



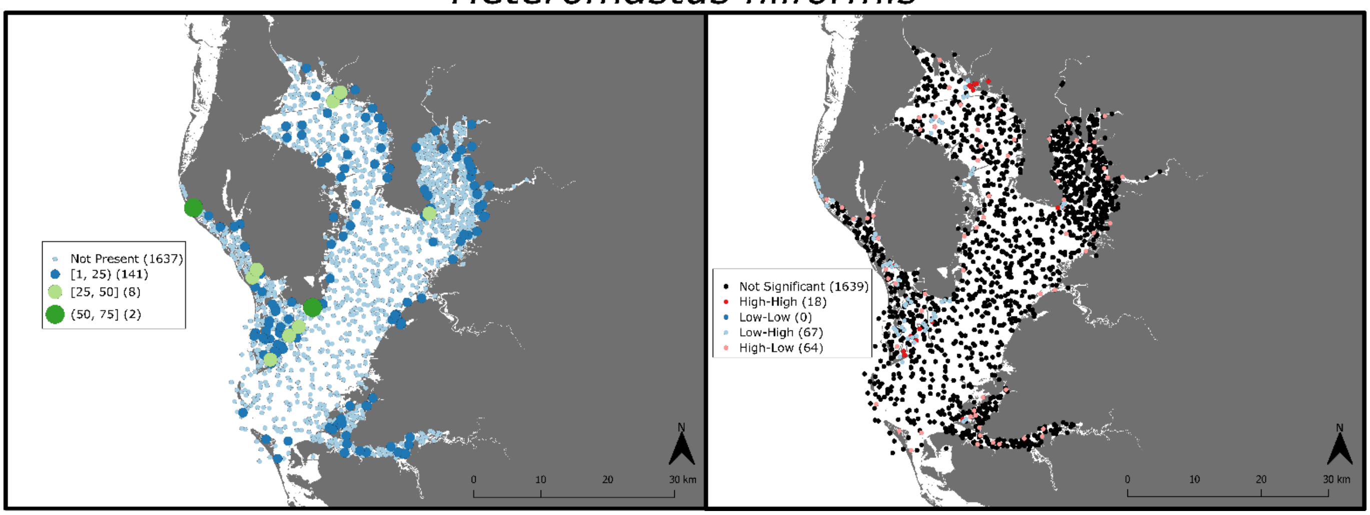
Capitella aciculata



Capitella jonesi



Heteromastus filiformis



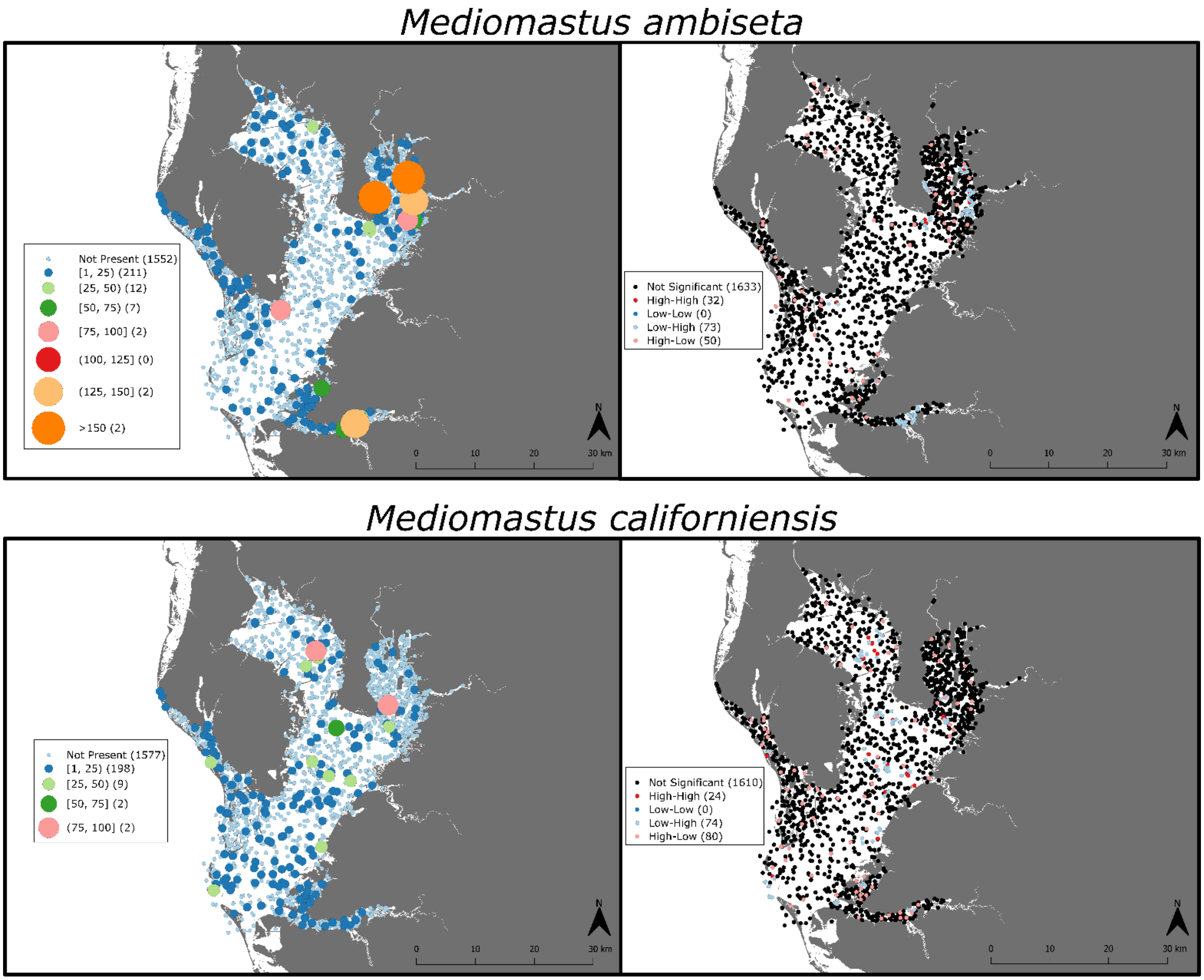


Figure S2: Bubble plots of species abundance and LISA scores for all species in Tampa Bay, 1993-2015. Bubble plots are colored by species abundance (No./0.04m^2) ranges and size is a function of abundance for that sample. LISA plot correlation significance was assessed with a pseudo p-value of 0.05. Neighborhoods were defined by the five nearest neighbors. Interpretation: a significant high-high correlation indicates that the sample has a high value and is neighbored by other samples with high values. Spatial analyses were conducted in GeoDa (Anselin, Syabri, and Kho 2006), processed in QGIS Desktop, and further modified with Inkscape. The Tampa Bay shapefile was sourced from the Florida Geographic Data Library.

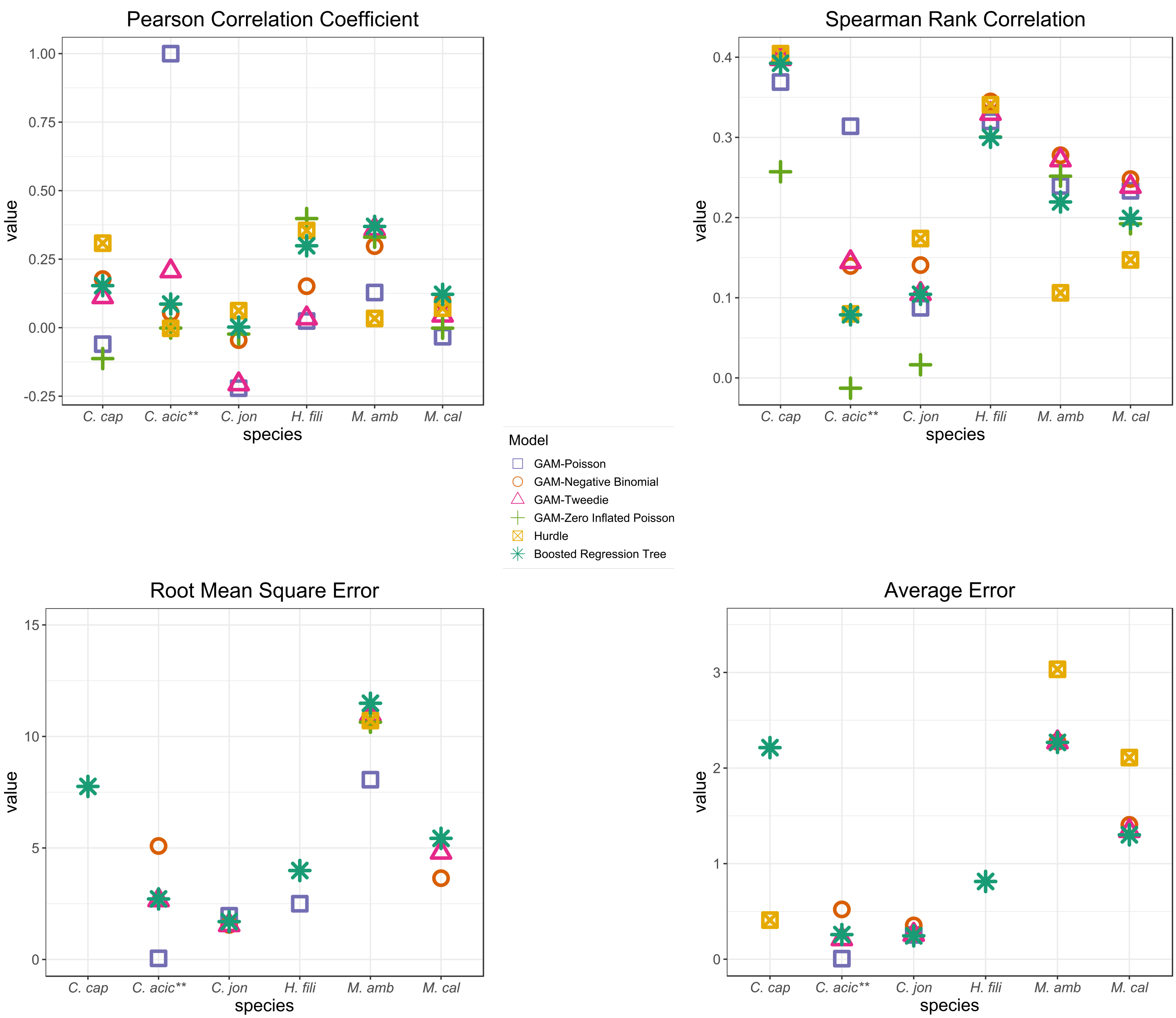


Figure S3: Plots of measures of correlation and error between observed and predicted values for all models using values from Table S2. Outlying values were not plotted for root mean square error and average error for visualization purposes. Excluded points are highlighted in Table S2. **Indicates that the biased, apparent values are used.

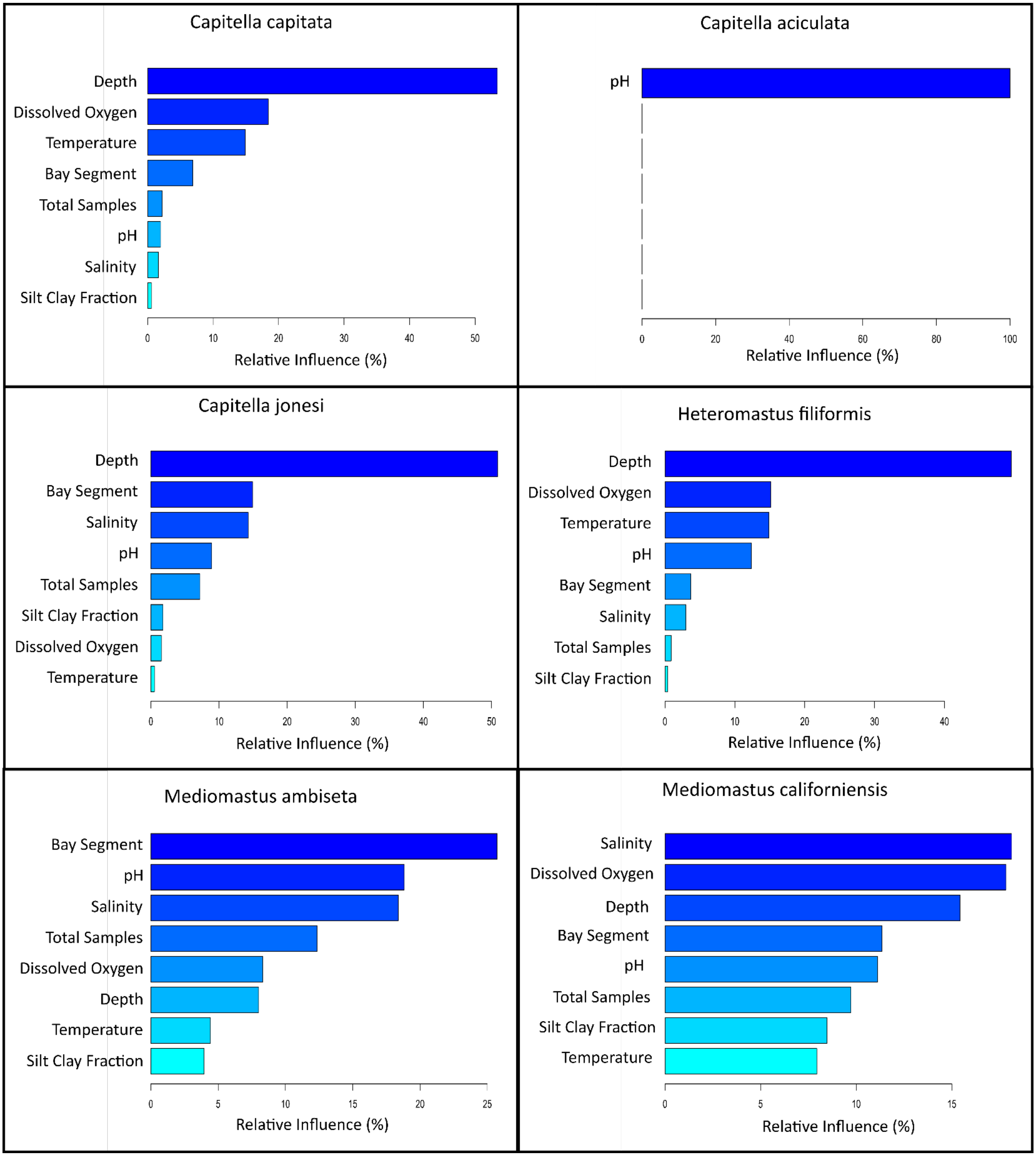


Figure S4: Plots of the relative influence of each term as determined with the Boosted Regression Trees. pH is the only term labeled for *Capitella aciculata* because every other term had zero influence. Environmental term units are outlined in Section 2.

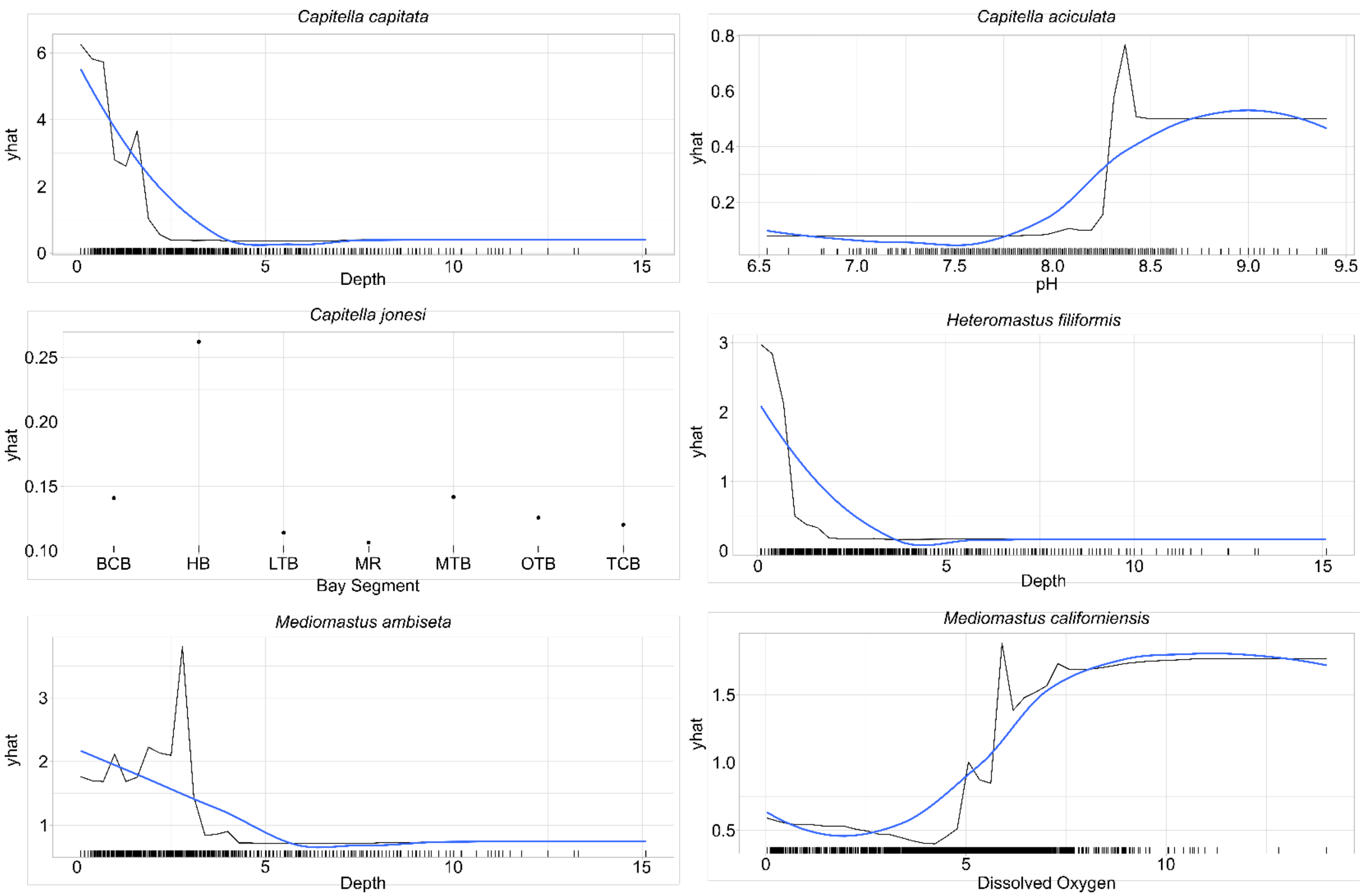


Figure S5: Partial Dependence Plots (PDP) of terms with top variable importance for each species. PDP scores (yhat) are interpreted as the difference between the model prediction (at a given instance of x) and the averaged model prediction. Continuous predictors include a rug plot on the x-axis for visualizing observation density. Abbreviations of bay segments and variable units are described in Section 2.