

Supplementary Table S1. One-way analyses of variance for shell- and tissue-based growth rates of *Crassostrea virginica* (~2.6 mm) exposed to elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	Between Groups	1	3.55E-04	3.55E-04	6.182	0.047*
	Residual	6	3.44E-04	5.74E-05		
	Total	7	6.99E-04	9.98E-05		
Tissue-based growth	Between Groups	1	5.81E-05	5.81E-05	136.116	<0.001*
	Residual	4	1.71E-06	4.27E-07		
	Total	5	5.98E-05	1.20E-05		

Supplementary Table S2. Two-way analyses of variance for shell- and tissue-based growth rates of *Crassostrea virginica* (~2.8 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L^{-1}). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	CO ₂	1	4.27E-04	4.27E-04	4.653	0.052
	Kelp	1	1.19E-03	1.19E-03	12.996	0.004*
	CO ₂ x Kelp	1	8.90E-04	8.90E-04	9.699	0.009*
	Residual	12	1.10E-03	9.18E-05		
	Total	15	3.61E-03	2.41E-04		
Tissue-based growth	CO ₂	1	1.40E-05	1.40E-05	4.367	0.059
	Kelp	1	8.00E-07	8.00E-07	0.250	0.626
	CO ₂ x Kelp	1	6.85E-06	6.85E-06	2.142	0.169
	Residual	12	3.84E-05	3.20E-06		
	Total	15	6.00E-05	4.00E-06		

Supplementary Table S3. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Crassostrea virginica* (~2.8 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L^{-1}). Asterisks next to p-values represent significant results.

Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	0.005	-0.016	0.025	0.904
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.002	-0.022	0.018	0.985
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.028	-0.048	-0.007	0.007*
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.007	-0.027	0.013	0.739
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.032	-0.052	-0.012	0.002*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-0.025	-0.045	-0.005	0.013*
Tissue-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	0.001	-0.003	0.004	0.970
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.002	-0.006	0.002	0.529
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	0.001	-0.002	0.005	0.682
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.002	-0.006	0.001	0.307
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	0.001	-0.003	0.005	0.902
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	0.003	-0.001	0.007	0.108

Supplementary Table S4. Two-way analyses of variance for shell- and tissue-based growth rates of *Mytilus edulis* (~2.3 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L^{-1}). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	CO ₂	1	4.65E-04	4.65E-04	3.272	0.096
	Kelp	1	1.62E-03	1.62E-03	11.400	0.006*
	CO ₂ x Kelp	1	2.06E-03	2.06E-03	14.493	0.002*
	Residual	12	1.71E-03	1.42E-04		
	Total	15	5.85E-03	3.90E-04		
Tissue-based growth	CO ₂	1	2.41E-05	2.41E-05	0.818	0.385
	Kelp	1	5.60E-04	5.60E-04	18.963	0.001*
	CO ₂ x Kelp	1	1.15E-04	1.15E-04	3.908	0.074
	Residual	11	3.25E-04	2.95E-05		
	Total	14	1.02E-03	7.31E-05		

Supplementary Table S5. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Mytilus edulis* (~2.3 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L^{-1}). Asterisks next to p-values represent significant results.

Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	0.012	-0.013	0.037	0.515
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	0.003	-0.022	0.028	0.990
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.031	-0.056	-0.006	0.015*
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.009	-0.034	0.016	0.691
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.043	-0.068	-0.018	0.001*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-0.033	-0.059	-0.008	0.009*
Tissue-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	0.003	-0.010	0.015	0.921
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.006	-0.019	0.006	0.465
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.015	-0.027	-0.002	0.019*
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.009	-0.020	0.003	0.156
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.017	-0.029	-0.006	0.004*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-0.009	-0.020	0.003	0.174

Supplementary Table S6. Two-way analyses of variance for shell- and tissue-based growth rates of *Mercenaria mercenaria* (~1.1 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	CO ₂	1	4.14E-04	4.14E-04	14.616	0.003*
	Kelp	1	8.99E-04	8.99E-04	31.772	<0.001*
	CO ₂ x Kelp	1	3.39E-04	3.39E-04	11.979	0.005*
	Residual	11	3.11E-04	2.83E-05		
	Total	14	1.96E-03	1.40E-04		
Tissue-based growth	CO ₂	1	3.41E-09	3.41E-09	0.005	0.943
	Kelp	1	1.18E-05	1.18E-05	18.535	0.002*
	CO ₂ x Kelp	1	2.64E-05	2.64E-05	41.399	<0.001*
	Residual	9	5.75E-06	6.39E-07		
	Total	12	4.40E-05	3.67E-06		

Supplementary Table S7. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Mercenaria mercenaria* (~1.1 mm) exposed to ambient or elevated $p\text{CO}_2$, with and without *Saccharina latissima* (1.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	-0.001	-0.014	0.011	0.988
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.005	-0.017	0.007	0.587
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.026	-0.038	-0.013	<0.001*
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.004	-0.015	0.007	0.729
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.024	-0.036	-0.013	<0.001*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-0.020	-0.032	-0.009	0.001*
Tissue-based growth	Elevated CO ₂ (Kelp) vs. Ambient CO ₂ (Kelp)	0.003	0.001	0.004	0.011*
	Ambient CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	0.001	-0.001	0.003	0.351
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (Kelp)	-0.002	-0.004	0.000	0.044*
	Ambient CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.001	-0.003	0.001	0.185
	Elevated CO ₂ (No kelp) vs. Elevated CO ₂ (Kelp)	-0.005	-0.007	-0.003	<0.001*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-0.003	-0.005	-0.001	0.004*
	Elevated CO ₂ (No kelp) vs. Ambient CO ₂ (No kelp)	-2.500	-4.748	-0.252	0.035*

Supplementary Table S8. One-way analyses of variance for shell- and tissue-based growth rates of *Mytilus edulis* (~5.7 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.3, 0.7, and 1.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	Between Groups	3	2.00E-03	6.66E-04	9.314	0.002*
	Residual	12	8.58E-04	7.15E-05		
	Total	15	2.86E-03	1.90E-04		
Tissue-based growth	Between Groups	3	5.18E-03	1.73E-03	36.879	<0.001*
	Residual	10	4.69E-04	4.69E-05		
	Total	13	5.65E-03	4.35E-04		

Supplementary Table S9. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Mytilus edulis* (~5.7 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.3, 0.7, and 1.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	1.0 g L ⁻¹ vs. Control	0.030	0.012	0.048	0.002*
	0.3 g L ⁻¹ vs. Control	0.021	0.003	0.039	0.020*
	0.7 g L ⁻¹ vs. Control	0.023	0.005	0.041	0.010*
	0.3 g L ⁻¹ vs. 1.0 g L ⁻¹	-0.009	-0.027	0.009	0.472
	0.7 g L ⁻¹ vs. 1.0 g L ⁻¹	-0.007	-0.025	0.011	0.680
	0.7 g L ⁻¹ vs. 0.3 g L ⁻¹	0.002	-0.016	0.020	0.983
Tissue-based growth	1.0 g L ⁻¹ vs. Control	0.044	0.028	0.060	<0.001*
	0.3 g L ⁻¹ vs. Control	0.003	-0.015	0.020	0.967
	0.7 g L ⁻¹ vs. Control	0.003	-0.013	0.019	0.943
	0.3 g L ⁻¹ vs. 1.0 g L ⁻¹	-0.042	-0.058	-0.026	<0.001*
	0.7 g L ⁻¹ vs. 1.0 g L ⁻¹	-0.042	-0.056	-0.027	<0.001*
	0.7 g L ⁻¹ vs. 0.3 g L ⁻¹	0.000	-0.016	0.016	1.000

Supplementary Table S10. One-way analyses of variance for shell- and tissue-based growth rates of *Crassostrea virginica* (~5.1 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.5, 1.0, and 2.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	Between Groups	3	5.96E-03	1.99E-03	26.123	<0.001*
	Residual	10	7.61E-04	7.61E-05		
	Total	13	6.72E-03	5.17E-04		
Tissue-based growth	Between Groups	3	5.94E-05	1.98E-05	10.440	0.001*
	Residual	12	2.28E-05	1.90E-06		
	Total	15	8.21E-05	5.48E-06		

Supplementary Table S11. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Crassostrea virginica* (~5.1 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.5, 1.0, and 2.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	2.0 g L ⁻¹ vs. Control	0.047	0.028	0.066	<0.001*
	0.5 g L ⁻¹ vs. Control	0.026	0.006	0.047	0.012*
	1.0 g L ⁻¹ vs. Control	0.050	0.029	0.070	<0.001*
	0.5 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.021	-0.041	0.000	0.046*
	1.0 g L ⁻¹ vs. 2.0 g L ⁻¹	0.003	-0.018	0.023	0.979
	1.0 g L ⁻¹ vs. 0.5 g L ⁻¹	0.023	0.002	0.045	0.035*
Tissue-based growth	2.0 g L ⁻¹ vs. Control	0.005	0.002	0.007	0.003*
	0.5 g L ⁻¹ vs. Control	0.002	0.000	0.005	0.104
	1.0 g L ⁻¹ vs. Control	0.005	0.002	0.008	0.002*
	0.5 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.002	-0.005	0.001	0.205
	1.0 g L ⁻¹ vs. 2.0 g L ⁻¹	0.000	-0.003	0.003	0.992
	1.0 g L ⁻¹ vs. 0.5 g L ⁻¹	0.002	-0.001	0.005	0.131

Supplementary Table S12. One-way analyses of variance for shell- and tissue-based growth rates of *Mytilus edulis* (~6.5 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.5, 1.0, and 2.0 g L⁻¹). Asterisks next to p-values represent significant results.

Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	Between Groups	3	2.33E-03	7.75E-04	33.309	<0.001*
	Residual	8	1.86E-04	2.33E-05		
	Total	11	2.51E-03	2.28E-04		
Tissue-based growth	Between Groups	3	3.59E-04	1.20E-04	6.766	0.008*
	Residual	11	1.95E-04	1.77E-05		
	Total	14	5.53E-04	3.95E-05		

Supplementary Table S13. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Mytilus edulis* (~6.5 mm) exposed to elevated $p\text{CO}_2$ and various densities of *Saccharina latissima* (0.5, 1.0, and 2.0 g L⁻¹). Asterisks next to p-values represent significant results.

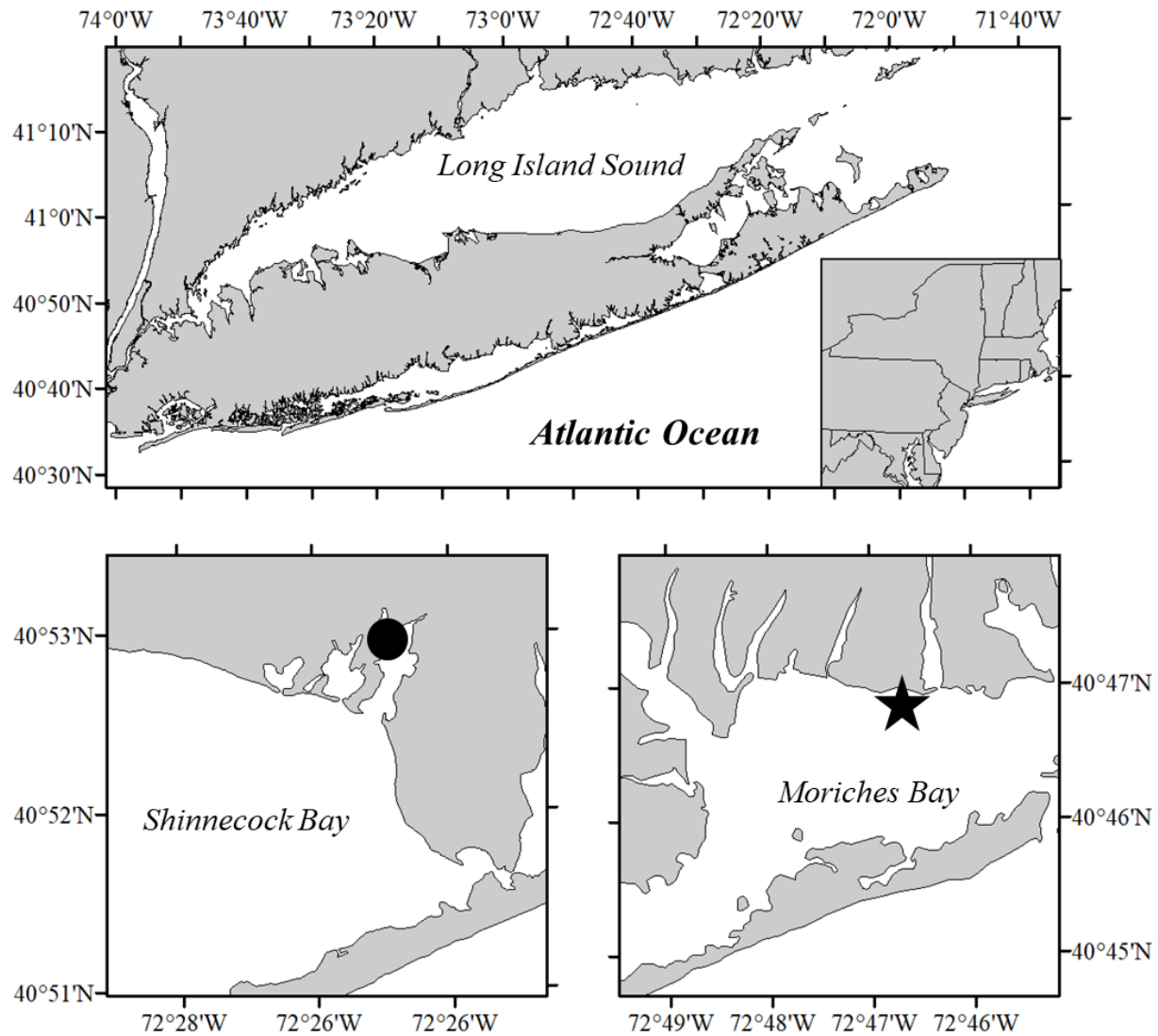
Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	2.0 g L ⁻¹ vs. Control	0.037	0.025	0.050	<0.001*
	0.5 g L ⁻¹ vs. Control	0.025	0.012	0.038	0.001*
	1.0 g L ⁻¹ vs. Control	0.030	0.017	0.042	<0.001*
	0.5 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.012	-0.025	0.000	0.060
	1.0 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.008	-0.020	0.005	0.286
	1.0 g L ⁻¹ vs. 0.5 g L ⁻¹	0.005	-0.008	0.017	0.676
Tissue-based growth	2.0 g L ⁻¹ vs. Control	0.013	0.004	0.023	0.007*
	0.5 g L ⁻¹ vs. Control	0.012	0.002	0.022	0.014*
	1.0 g L ⁻¹ vs. Control	0.010	0.000	0.020	0.042*
	0.5 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.001	-0.010	0.008	0.977
	1.0 g L ⁻¹ vs. 2.0 g L ⁻¹	-0.003	-0.012	0.006	0.684
	1.0 g L ⁻¹ vs. 0.5 g L ⁻¹	-0.002	-0.011	0.007	0.886

Supplementary Table S14. Two-way analyses of variance for shell- and tissue-based growth rates of *Crassostrea virginica* (~3.0 mm) grown at control, on-kelp, and off-kelp (*S. latissima*) sites at the Great Gun hatchery in Center Moriches, NY, USA during May 2021. Asterisks next to p-values represent significant results.

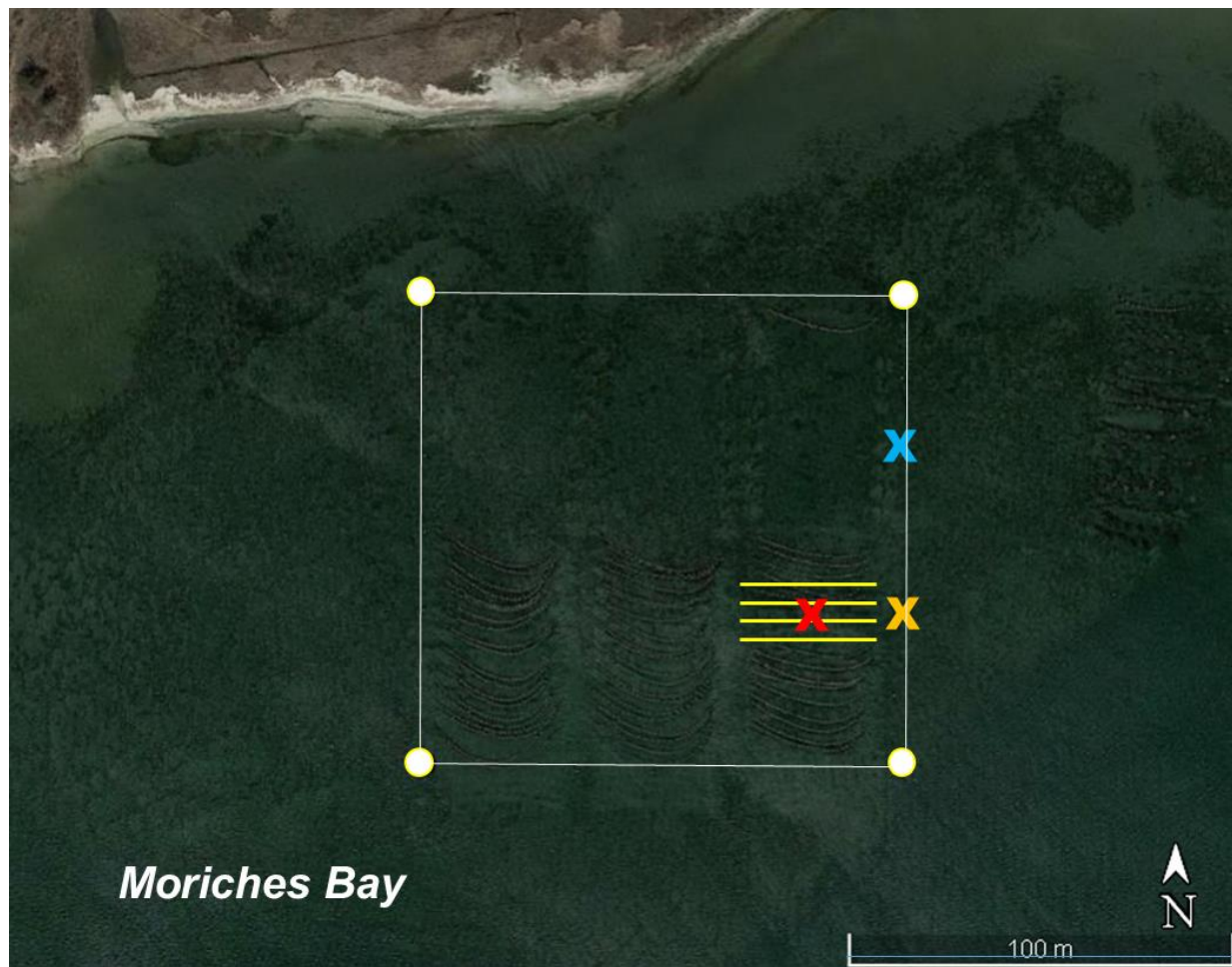
Parameter	Sources of variation	DF	SS	MS	F	P
Shell-based growth	Between Groups	2	1.44E-03	7.19E-04	43.929	0.001*
	Residual	5	8.19E-05	1.64E-05		
	Total	7	1.52E-03	2.17E-04		
Tissue-based growth	Between Groups	2	2.32E-04	1.16E-04	34.015	0.009*
	Residual	3	1.02E-05	3.40E-06		
	Total	5	2.42E-04	4.84E-05		

Supplementary Table S15. Tukey Honest Significant Difference tests for shell- and tissue-based growth rates of *Crassostrea virginica* (~3.0 mm) grown at control, on-kelp, and off-kelp (*S. latissima*) sites at the Great Gun hatchery in Center Moriches, NY, USA during May 2021. Asterisks next to p-values represent significant results.

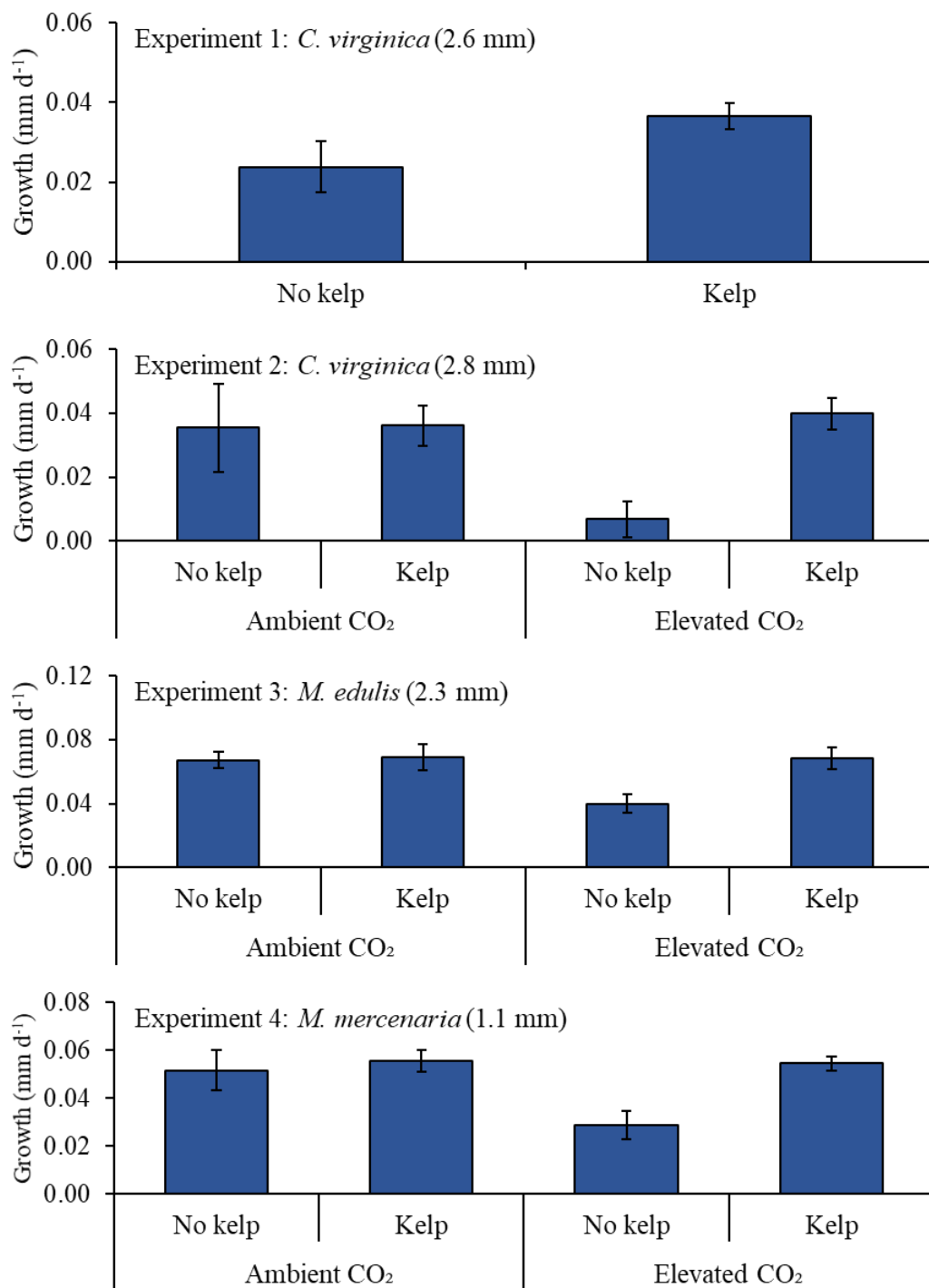
Parameter	Comparisons	Diff	Lower	Upper	P-value
Shell-based growth	On-kelp vs. Control	0.035	0.022	0.047	0.001*
	Off-kelp vs. Control	0.012	0.001	0.022	0.037*
	Off-kelp vs. On-kelp	-0.023	-0.035	-0.011	0.004*
Tissue-based growth	On-kelp vs. Control	0.015	0.007	0.023	0.008*
	Off-kelp vs. Control	0.007	-0.001	0.014	0.073
	Off-kelp vs. On-kelp	-0.009	-0.016	-0.001	0.038*



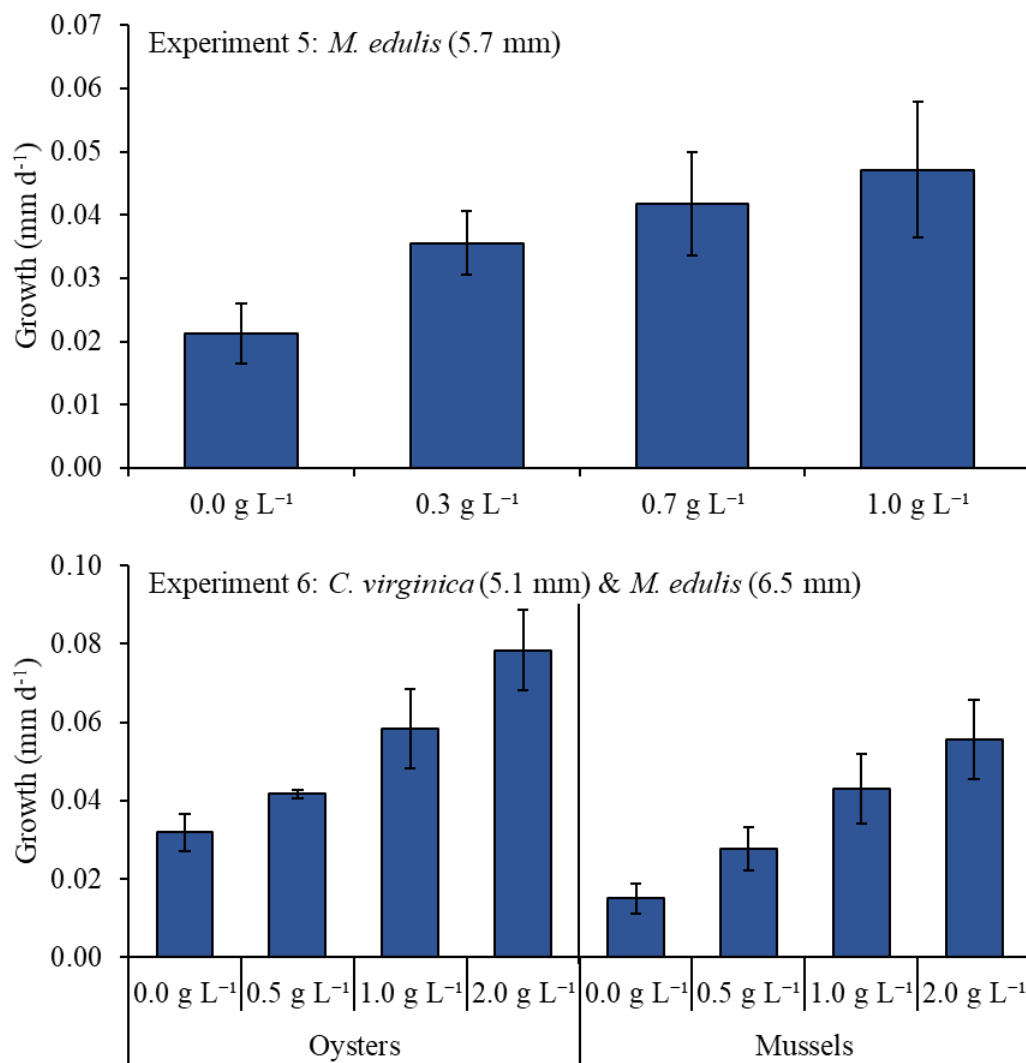
Supplementary Figure S1. Map of Shinnecock Bay and Moriches Bay, NY, USA. All maps were created using ArcMap 10.4.1 (Esri). On the map, the circle and star represent collection sites for *Mytilus edulis* and *Saccharina latissima* used in experiments, respectively.



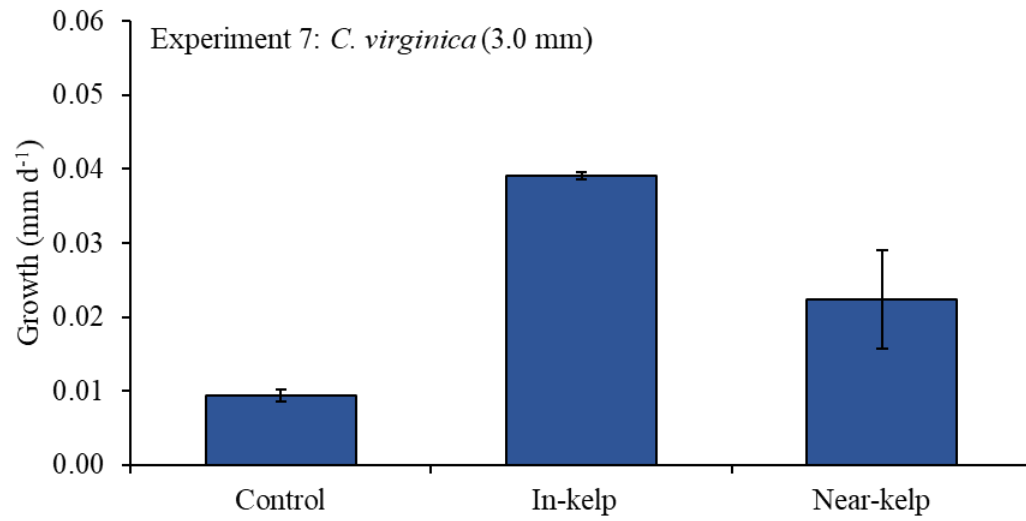
Supplementary Figure S2. Design of the field experiment in Moriches Bay, NY. The white circles mark the corner and coordinates of the ~two-acre oyster farm (Great Gun), and the white lines mark the boundaries. The yellow lines show the placement of the four 33-m kelp lines, which are spaced ~2.5-m apart. The 'X' symbols mark the locations of the experimental oyster cages: Red X = Inside-kelp; Orange X = Near-kelp; Blue X = Outside-kelp



Supplementary Figure S3. Shell-based growth rates, based on shell width, of bivalves grown in ambient and/or elevated $p\text{CO}_2$, with and without kelp (*S. latissima*; 1 g L⁻¹) (Experiments 1 – 4).



Supplementary Figure S4. Shell-based growth rates, based on shell width, of bivalves grown in elevated $p\text{CO}_2$, with increasing densities of kelp (*S. latissima*) (Experiments 5 and 6).



Supplementary Figure S5. Shell-based growth rates, based on shell width, of *C. virginica* grown at control, in-kelp, and near-kelp (*S. latissima*) sites at the Great Gunn hatchery in Center Moriches, NY, USA during May 2021 (Experiment 7).