

Tables S1. Values of pH (total scale), temperature ($^{\circ}\text{C}$), salinity (g kg^{-1}), dissolved oxygen (DO; mg L^{-1}), pCO_2 (μatm), total alkalinity ($\mu\text{mol kgSW}^{-1}$), total DIC ($\mu\text{mol kgSW}^{-1}$), HCO_3^- ($\mu\text{mol kgSW}^{-1}$), CO_3^{2-} ($\mu\text{mol kgSW}^{-1}$), OH^- ($\mu\text{mol kgSW}^{-1}$), Ω_{calcite} , and $\Omega_{\text{aragonite}}$ for June through November experiments. Values represent means \pm standard error.

Mercenaria mercenaria – smaller cohorts

Parameter	Control	<i>Ulva</i>	CO_2	CO_2/Ulva
pH	8.11 \pm 0.04	8.13 \pm 0.04	7.47 \pm 0.03	7.49 \pm 0.03
Temperature	20.9 \pm 0.5	20.9 \pm 0.5	20.9 \pm 0.4	20.9 \pm 0.4
DO	9.41 \pm 0.13	9.29 \pm 0.15	9.26 \pm 0.09	9.13 \pm 0.11
Salinity	30.0 \pm 0.6	30.0 \pm 0.6	30.0 \pm 0.6	30.0 \pm 0.6
pCO_2	309 \pm 27	290 \pm 33	1580 \pm 112	1513 \pm 99
Total alkalinity	2068 \pm 23	2066 \pm 19	2023 \pm 9	2019 \pm 7
Total DIC	1815 \pm 200	1790 \pm 197	2004 \pm 220	1992 \pm 219
HCO_3^-	1628 \pm 15	1598 \pm 18	1905 \pm 10	1894 \pm 10
CO_3^{2-}	180 \pm 14	183 \pm 19	48 \pm 4	49 \pm 4
OH^-	4.40 \pm 0.39	4.75 \pm 0.32	1.17 \pm 0.09	1.25 \pm 0.07
Ω_{calcite}	4.40 \pm 0.39	4.75 \pm 0.32	1.17 \pm 0.09	1.25 \pm 0.07
$\Omega_{\text{aragonite}}$	2.83 \pm 0.25	3.06 \pm 0.21	0.76 \pm 0.06	0.80 \pm 0.05

Mercenaria mercenaria – larger cohorts

Parameter	Control	<i>Ulva</i>	CO_2	CO_2/Ulva
pH	7.91 \pm 0.07	7.95 \pm 0.08	7.34 \pm 0.02	7.36 \pm 0.02
Temperature	21.1 \pm 0.5	21.1 \pm 0.5	21.1 \pm 0.5	21.1 \pm 0.5
DO	9.06 \pm 0.15	9.07 \pm 0.14	9.21 \pm 0.17	8.95 \pm 0.09
Salinity	30.0 \pm 0.6	30.0 \pm 0.6	30.0 \pm 0.6	30.0 \pm 0.6
pCO_2	435 \pm 86	338 \pm 74	1541 \pm 73	1634 \pm 68
Total alkalinity	1663 \pm 24	1450 \pm 8	1436 \pm 3	1601 \pm 4
Total DIC	1527 \pm 168	1293 \pm 142	1444 \pm 159	1606 \pm 177
HCO_3^-	1415 \pm 12	1192 \pm 12	1369 \pm 1	1524 \pm 1
CO_3^{2-}	98 \pm 15	90 \pm 14	25 \pm 1	29 \pm 1
OH^-	3.09 \pm 0.46	3.86 \pm 0.23	0.87 \pm 0.05	0.90 \pm 0.07
Ω_{calcite}	2.34 \pm 0.34	2.43 \pm 0.12	0.62 \pm 0.02	0.73 \pm 0.03
$\Omega_{\text{aragonite}}$	1.50 \pm 0.22	1.57 \pm 0.08	0.40 \pm 0.01	0.47 \pm 0.02

Crassostrea virginica – smaller cohorts

Parameter	Control	<i>Ulva</i>	CO ₂	CO ₂ / <i>Ulva</i>
pH	8.09±0.05	8.21±0.11	7.44±0.03	7.46±0.05
Temperature	21.6±0.6	21.6±0.6	21.6±0.7	21.6±0.6
DO	9.23±0.11	8.97±0.08	9.13±0.09	9.02±0.10
Salinity	30.0±0.6	30.0±0.6	30.0±0.6	30.0±0.6
pCO ₂	287±37	210±55	1649±120	1513±158
Total alkalinity	1830±22	1832±68	1971±8	1895±13
Total DIC	1600±176	1541±170	1957±215	1875±206
HCO ₃ ⁻	1437±13	1343±44	1860±1	1782±1
CO ₃ ²⁻	154±14	192±45	45±3	45±5
OH ⁻	5.16±0.51	6.93±1.99	1.15±0.09	1.21±0.18
Ω _{calcite}	3.84±0.35	4.78±1.13	1.11±0.07	1.12±0.13
Ω _{aragonite}	2.47±0.23	3.08±0.73	0.72±0.05	0.72±0.08

Crassostrea virginica – larger cohorts

Parameter	Control	<i>Ulva</i>	CO ₂	CO ₂ / <i>Ulva</i>
pH	7.87±0.05	7.92±0.06	7.30±0.03	7.31±0.03
Temperature	20.8±0.6	20.8±0.5	20.9±0.5	20.9±0.5
DO	8.97±0.17	8.56±0.74	9.02±0.16	8.97±0.16
Salinity	29.0±0.6	29.1±0.6	28.9±0.6	29.0±0.6
pCO ₂	398±49	363±55	1945±150	1825±144
Total alkalinity	1374±15	1459±20	1647±3	1576±7
Total DIC	1265±139	1327±146	1673±184	1592±175
HCO ₃ ⁻	1180±7	1230±10	1584±2	1507±2
CO ₃ ²⁻	71±8	85±11	25±1	26±2
OH ⁻	2.79±0.35	3.20±0.47	0.74±0.07	0.79±0.06
Ω _{calcite}	1.78±0.21	2.13±0.29	0.63±0.02	0.64±0.05
Ω _{aragonite}	1.14±0.13	1.37±0.18	0.41±0.02	0.42±0.03

Argopecten irradians – smaller cohorts

Parameter	Control	<i>Ulva</i>	CO ₂	CO ₂ / <i>Ulva</i>
pH	7.94±0.03	8.01±0.07	7.35±0.03	7.37±0.04
Temperature	21.8±0.9	21.8±0.9	21.8±0.9	21.7±0.9
DO	9.16±0.16	9.00±0.16	9.00±0.16	9.01±0.16
Salinity	30.0±0.6	30.0±0.6	30.0±0.6	30.0±0.6
pCO ₂	422±28	368±62	1898±137	1938±196
Total alkalinity	1778±12	1839±36	1816±7	1947±11
Total DIC	1615±178	1644±181	1824±201	1951±215
HCO ₃ ⁻	1489±7	1499±21	1730±2	1852±2
CO ₃ ²⁻	112±8	133±23	34±2	38±4
OH ⁻	3.58±0.31	4.33±0.92	0.93±0.07	0.98±0.09
Ω _{calcite}	2.80±0.19	3.32±0.57	0.84±0.05	0.94±0.09
Ω _{aragonite}	1.80±0.12	2.14±0.37	0.54±0.03	0.61±0.06

Argopecten irradians – larger cohorts

Parameter	Control	<i>Ulva</i>	CO ₂	CO ₂ / <i>Ulva</i>
pH	7.96±0.02	7.99±0.03	7.34±0.04	7.36±0.04
Temperature	21.2±0.6	21.1±0.5	21.3±0.5	21.3±0.6
DO	8.86±0.18	9.06±0.32	8.96±0.21	9.20±0.17
Salinity	30.4±0.6	30.4±0.6	30.5±0.6	30.4±0.6
pCO ₂	405±18	396±33	2018±171	1962±159
Total alkalinity	1803±7	1888±14	1899±10	1919±9
Total DIC	1633±180	1702±187	1911±210	1926±212
HCO ₃ ⁻	1503±4	1560±7	1812±2	1828±2
CO ₃ ²⁻	117±5	129±8	35±3	36±3
OH ⁻	3.65±0.21	3.85±0.28	0.91±0.08	0.95±0.08
Ω _{calcite}	2.90±0.11	3.19±0.21	0.85±0.07	0.89±0.07
Ω _{aragonite}	1.87±0.07	2.06±0.13	0.55±0.05	0.58±0.04

Mytilus edulis

Parameter	Control	<i>Ulva</i>	CO ₂	CO ₂ / <i>Ulva</i>
pH	7.98±0.11	8.00±0.10	7.36±0.07	7.37±0.07
Temperature	21.7±0.9	21.7±0.9	21.7±1.0	21.7±1.0
DO	9.12±0.17	9.08±0.14	9.05±0.16	9.09±0.13
Salinity	31.0±0.6	31.0±0.6	31.0±0.6	31.0±0.6
pCO ₂	357±85	361±78	1648±226	1636±223
Total alkalinity	1629±32	1765±51	1617±10	1643±18
Total DIC	1472±162	1572±173	1624±179	1642±181
HCO ₃ ⁻	1345±29	1432±30	1540±2	1557±2
CO ₃ ²⁻	103±19	129±32	29±3	33±6
OH ⁻	3.34±0.33	4.40±1.44	0.90±0.13	1.02±0.26
Ω _{calcite}	2.55±0.47	3.19±0.81	0.72±0.08	0.81±0.16
Ω _{aragonite}	1.65±0.31	2.06±0.53	0.47±0.05	0.53±0.11

Table S2. Two-way analyses of variance for Ω_{calcite} for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	112.366	112.366	1559.605	<0.001*
	<i>Ulva</i>	1	0.486	0.486	6.752	0.013*
	CO ₂ x <i>Ulva</i>	1	0.157	0.157	2.176	0.149
	Residual	36	2.594	0.072		
	Total	39	115.403	2.959		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	22.839	22.839	849.289	<0.001*
	<i>Ulva</i>	1	0.127	0.127	4.72	0.038*
	CO ₂ x <i>Ulva</i>	1	0.00227	0.00227	0.0844	0.773
	Residual	29	0.78	0.0269		
	Total	32	23.695	0.74		
<i>Crassostrea virginica</i> (small)	CO ₂	1	91.745	91.745	257.28	<0.001*
	<i>Ulva</i>	1	2.022	2.022	5.669	0.023*
	CO ₂ x <i>Ulva</i>	1	1.956	1.956	5.485	0.026*
	Residual	32	11.411	0.357		
	Total	35	107.134	3.061		
<i>Crassostrea virginica</i> (large)	CO ₂	1	17.92	17.92	483.796	<0.001*
	<i>Ulva</i>	1	0.33	0.33	8.902	0.005*
	CO ₂ x <i>Ulva</i>	1	0.287	0.287	7.741	0.008*
	Residual	38	1.408	0.037		
	Total	41	20.161	0.492		
<i>Argopecten irradians</i> (small)	CO ₂	1	37.555	37.555	406.711	<0.001*
	<i>Ulva</i>	1	0.786	0.786	8.513	0.007*
	CO ₂ x <i>Ulva</i>	1	0.344	0.344	3.72	0.064
	Residual	28	2.585	0.0923		
	Total	31	41.27	1.331		
<i>Argopecten irradians</i> (large)	CO ₂	1	61.356	61.356	3715.401	<0.001*
	<i>Ulva</i>	1	0.366	0.366	22.184	<0.001*
	CO ₂ x <i>Ulva</i>	1	0.218	0.218	13.183	<0.001*
	Residual	48	0.793	0.0165		
	Total	51	62.733	1.23		
<i>Mytilus edulis</i>	CO ₂	1	39.294	39.294	163.406	<0.001*
	<i>Ulva</i>	1	1.16	1.16	4.822	0.035*
	CO ₂ x <i>Ulva</i>	1	0.661	0.661	2.749	0.107
	Residual	32	7.695	0.24		
	Total	35	50.455	1.442		

Table S3. Two-way analyses of variance for $\Omega_{\text{aragonite}}$ for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	48.218	48.218	1641.78	<0.001*
	<i>Ulva</i>	1	0.187	0.187	6.359	0.016*
	CO ₂ x <i>Ulva</i>	1	0.0839	0.0839	2.856	0.099
	Residual	38	1.116	0.0294		
	Total	41	50.024	1.22		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	9.474	9.474	848.148	<0.001*
	<i>Ulva</i>	1	0.0539	0.0539	4.827	0.036*
	CO ₂ x <i>Ulva</i>	1	0.00078	0.00078	0.0697	0.794
	Residual	29	0.324	0.0112		
	Total	32	9.83	0.307		
<i>Crassostrea virginica</i> (small)	CO ₂	1	38.151	38.151	256.225	<0.001*
	<i>Ulva</i>	1	0.843	0.843	5.664	0.023*
	CO ₂ x <i>Ulva</i>	1	0.813	0.813	5.46	0.026*
	Residual	32	4.765	0.149		
	Total	35	44.571	1.273		
<i>Crassostrea virginica</i> (large)	CO ₂	1	7.276	7.276	475.686	<0.001*
	<i>Ulva</i>	1	0.139	0.139	9.094	0.005*
	CO ₂ x <i>Ulva</i>	1	0.115	0.115	7.531	0.009*
	Residual	38	0.581	0.0153		
	Total	41	8.218	0.2		
<i>Argopecten irradians</i> (small)	CO ₂	1	15.648	15.648	400.024	<0.001*
	<i>Ulva</i>	1	0.328	0.328	8.377	0.007*
	CO ₂ x <i>Ulva</i>	1	0.143	0.143	3.652	0.066*
	Residual	28	1.095	0.0391		
	Total	31	17.214	0.555		
<i>Argopecten irradians</i> (large)	CO ₂	1	25.536	25.536	3709.725	<0.001*
	<i>Ulva</i>	1	0.152	0.152	22.138	<0.001*
	CO ₂ x <i>Ulva</i>	1	0.0893	0.0893	12.974	<0.001*
	Residual	48	0.33	0.00688		
	Total	51	26.108	0.512		
<i>Mytilus edulis</i>	CO ₂	1	16.436	16.436	159.827	<0.001*
	<i>Ulva</i>	1	0.488	0.488	4.743	0.037*
	CO ₂ x <i>Ulva</i>	1	0.282	0.282	2.738	0.108
	Residual	32	3.291	0.103		
	Total	35	21.189	0.605		

Table S4. Two-way analyses of variance for shell length-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	0.00293	0.00293	82.534	<0.001*
	<i>Ulva</i>	1	0.000358	0.000358	10.107	0.009*
	CO ₂ x <i>Ulva</i>	1	6.44E-05	6.44E-05	1.815	0.205
	Residual	11	0.00039	3.55E-05		
	Total	14	0.00354	0.000253		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	0.00171	0.00171	26.255	<0.001*
	<i>Ulva</i>	1	0.000668	0.000668	10.278	0.008*
	CO ₂ x <i>Ulva</i>	1	0.000153	0.000153	2.348	0.154
	Residual	11	0.000715	0.000065		
	Total	14	0.003	0.000214		
<i>Crassostrea virginica</i> (small)	CO ₂	1	0.00395	0.00395	10.536	0.009*
	<i>Ulva</i>	1	0.0022	0.0022	5.879	0.036*
	CO ₂ x <i>Ulva</i>	1	0.000368	0.000368	0.983	0.345
	Residual	10	0.00375	0.000375		
	Total	13	0.01	0.000769		
<i>Crassostrea virginica</i> (large)	CO ₂	1	0.0327	0.0327	34.363	<0.001*
	<i>Ulva</i>	1	0.0111	0.0111	11.647	0.011*
	CO ₂ x <i>Ulva</i>	1	0.00204	0.00204	2.148	0.186
	Residual	7	0.00666	0.000951		
	Total	10	0.0523	0.00523		
<i>Argopecten irradians</i> (small)	CO ₂	1	0.00242	0.00242	31.308	<0.001*
	<i>Ulva</i>	1	0.000917	0.000917	11.841	0.005*
	CO ₂ x <i>Ulva</i>	1	0.000303	0.000303	3.91	0.071
	Residual	12	0.000929	7.74E-05		
	Total	15	0.00457	0.000305		
<i>Argopecten irradians</i> (large)	CO ₂	1	0.0035	0.0035	37.967	<0.001*
	<i>Ulva</i>	1	0.001	0.001	10.852	0.013*
	CO ₂ x <i>Ulva</i>	1	0.000236	0.000236	2.561	0.154
	Residual	7	0.000645	9.22E-05		
	Total	10	0.00579	0.000579		
<i>Mytilus edulis</i>	CO ₂	1	0.000439	0.000439	2.93	0.118
	<i>Ulva</i>	1	0.000786	0.000786	5.246	0.045*
	CO ₂ x <i>Ulva</i>	1	2.95E-05	2.95E-05	0.196	0.667
	Residual	10	0.0015	0.00015		
	Total	13	0.0028	0.000215		

Table S5. Two-way analyses of variance for shell weight-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of Variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	0.0135	0.0135	21.016	<0.001*
	<i>Ulva</i>	1	0.00405	0.00405	6.318	0.027*
	CO ₂ x <i>Ulva</i>	1	0.000164	0.000164	0.255	0.623
	Residual	12	0.00769	0.000641		
	Total	15	0.0254	0.00169		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	0.219	0.219	16.719	0.003*
	<i>Ulva</i>	1	0.256	0.256	19.553	0.002*
	CO ₂ x <i>Ulva</i>	1	0.0489	0.0489	3.731	0.085
	Residual	9	0.118	0.0131		
	Total	12	0.612	0.051		
<i>Crassostrea virginica</i> (small)	CO ₂	1	0.0341	0.0341	8.801	0.013*
	<i>Ulva</i>	1	0.000106	0.000106	0.0274	0.871
	CO ₂ x <i>Ulva</i>	1	0.000373	0.000373	0.0961	0.762
	Residual	11	0.0427	0.00388		
	Total	14	0.0779	0.00557		
<i>Crassostrea virginica</i> (large)	CO ₂	1	18.779	18.779	0.907	0.373
	<i>Ulva</i>	1	33.088	33.088	1.598	0.247
	CO ₂ x <i>Ulva</i>	1	21.713	21.713	1.049	0.340
	Residual	7	144.951	20.707		
	Total	10	223.95	22.395		
<i>Argopecten irradians</i> (small)	CO ₂	1	0.119	0.119	9.587	0.009*
	<i>Ulva</i>	1	0.00428	0.00428	0.344	0.569
	CO ₂ x <i>Ulva</i>	1	0.00553	0.00553	0.444	0.518
	Residual	12	0.149	0.0124		
	Total	15	0.278	0.0186		
<i>Argopecten irradians</i> (large)	CO ₂	1	1.172	1.172	0.305	0.600
	<i>Ulva</i>	1	3.929	3.929	1.024	0.351
	CO ₂ x <i>Ulva</i>	1	0.00124	0.00124	0.000323	0.986
	Residual	6	23.015	3.836		
	Total	9	29.223	3.247		
<i>Mytilus edulis</i>	CO ₂	1	0.0113	0.0113	2.153	0.168
	<i>Ulva</i>	1	0.0282	0.0282	5.392	0.039*
	CO ₂ x <i>Ulva</i>	1	0.00109	0.00109	0.209	0.656
	Residual	12	0.0628	0.00523		
	Total	15	0.103	0.00689		

Table S6. Two-way analyses of variance for tissue weight-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of Variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	0.000121	0.000121	8.339	0.018*
	<i>Ulva</i>	1	0.000146	0.000146	10.006	0.011*
	CO ₂ x <i>Ulva</i>	1	2.66E-07	2.66E-07	0.0183	0.895
	Residual	9	0.000131	1.46E-05		
	Total	12	0.000382	3.18E-05		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	0.000996	0.000996	23.216	<0.001*
	<i>Ulva</i>	1	0.000588	0.000588	13.703	0.005*
	CO ₂ x <i>Ulva</i>	1	1.19E-05	1.19E-05	0.276	0.612
	Residual	9	0.000386	4.29E-05		
	Total	12	0.00189	0.000157		
<i>Crassostrea virginica</i> (small)	CO ₂	1	0.00177	0.00177	11.614	0.007*
	<i>Ulva</i>	1	0.000183	0.000183	1.201	0.299
	CO ₂ x <i>Ulva</i>	1	8.87E-07	8.87E-07	0.00584	0.941
	Residual	10	0.00152	0.000152		
	Total	13	0.00334	0.000257		
<i>Crassostrea virginica</i> (large)	CO ₂	1	3.141	3.141	1.034	0.356
	<i>Ulva</i>	1	0.549	0.549	0.181	0.688
	CO ₂ x <i>Ulva</i>	1	26.628	26.628	8.768	0.031*
	Residual	5	15.185	3.037		
	Total	8	43.69	5.461		
<i>Argopecten irradians</i> (small)	CO ₂	1	0.00322	0.00322	8.107	0.016*
	<i>Ulva</i>	1	0.000807	0.000807	2.031	0.182
	CO ₂ x <i>Ulva</i>	1	3.30E-06	3.30E-06	0.00831	0.929
	Residual	11	0.00437	0.000398		
	Total	14	0.00868	0.00062		
<i>Argopecten irradians</i> (large)	CO ₂	1	0.517	0.517	10.081	0.034
	<i>Ulva</i>	1	0.796	0.796	15.505	0.017*
	CO ₂ x <i>Ulva</i>	1	0.0685	0.0685	1.334	0.312
	Residual	4	0.205	0.0513		
	Total	7	1.587	0.227		
<i>Mytilus edulis</i>	CO ₂	1	0.000337	0.000337	2.136	0.172
	<i>Ulva</i>	1	0.000794	0.000794	5.026	0.047*
	CO ₂ x <i>Ulva</i>	1	5.96E-05	5.96E-05	0.377	0.552
	Residual	11	0.00174	0.000158		
	Total	14	0.00303	0.000216		

Table S7. Tukey Honest Significant Difference tests for shell length-based growth for tissue weight-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (cohort)	Treatment	Difference	Lower	Upper	P-value
<i>Mercenaria mercenaria</i> (small)	CO ₂ vs. Control	-0.032	-0.046	-0.019	<0.001*
	<i>Ulva</i> vs. Control	0.006	-0.007	0.018	0.554
	CO ₂ / <i>Ulva</i> vs. Control	-0.018	-0.031	-0.006	0.005*
	<i>Ulva</i> vs. CO ₂	0.038	0.024	0.052	<0.001*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.014	0.000	0.028	0.044*
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.024	-0.037	-0.011	0.001*
<i>Mercenaria mercenaria</i> (large)	CO ₂ vs. Control	-0.005	-0.022	0.012	0.796
	<i>Ulva</i> vs. Control	0.030	0.012	0.048	0.002*
	CO ₂ / <i>Ulva</i> vs. Control	0.002	-0.015	0.019	0.984
	<i>Ulva</i> vs. CO ₂	0.035	0.017	0.053	0.001*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.007	-0.010	0.024	0.598
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.028	-0.046	-0.010	0.003*
<i>Crassostrea virginica</i> (small)	CO ₂ vs. Control	-0.027	-0.071	0.017	0.289
	<i>Ulva</i> vs. Control	0.049	0.002	0.096	0.040*
	CO ₂ / <i>Ulva</i> vs. Control	-0.012	-0.059	0.035	0.861
	<i>Ulva</i> vs. CO ₂	0.076	0.029	0.123	0.003*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.015	-0.032	0.062	0.767
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.061	-0.111	-0.011	0.018*
<i>Crassostrea virginica</i> (large)	CO ₂ vs. Control	-0.138	-0.222	-0.055	0.004*
	<i>Ulva</i> vs. Control	0.037	-0.056	0.130	0.587
	CO ₂ / <i>Ulva</i> vs. Control	-0.046	-0.130	0.037	0.333
	<i>Ulva</i> vs. CO ₂	0.175	0.082	0.268	0.002*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.092	0.009	0.176	0.032*
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.083	-0.176	0.010	0.080
<i>Argopecten irradians</i> (small)	CO ₂ vs. Control	-0.033	-0.052	-0.015	0.001*
	<i>Ulva</i> vs. Control	0.006	-0.012	0.025	0.733
	CO ₂ / <i>Ulva</i> vs. Control	-0.009	-0.028	0.009	0.455
	<i>Ulva</i> vs. CO ₂	0.040	0.021	0.058	<0.001*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.024	0.005	0.042	0.011*
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.016	-0.034	0.003	0.100
<i>Argopecten irradians</i> (large)	CO ₂ vs. Control	-0.027	-0.053	-0.001	0.043*
	<i>Ulva</i> vs. Control	0.029	0.003	0.055	0.032*
	CO ₂ / <i>Ulva</i> vs. Control	-0.017	-0.046	0.012	0.300
	<i>Ulva</i> vs. CO ₂	0.056	0.030	0.082	0.001*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.010	-0.019	0.039	0.681
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.046	-0.075	-0.017	0.005*
<i>Mytilus edulis</i>	CO ₂ vs. Control	0.014	-0.012	0.041	0.398
	<i>Ulva</i> vs. Control	0.018	-0.011	0.047	0.275
	CO ₂ / <i>Ulva</i> vs. Control	0.026	-0.002	0.055	0.072
	<i>Ulva</i> vs. CO ₂	0.004	-0.025	0.032	0.976
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.012	-0.016	0.041	0.580
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	0.008	-0.022	0.039	0.835

Table S8. Tukey Honest Significant Difference tests for shell weight-based growth for tissue weight-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (cohort)	Treatment	Difference	Lower	Upper	P-value
<i>Mercenaria mercenaria</i> (small)	CO ₂ vs. Control	-0.058	-0.117	0.000	0.051
	<i>Ulva</i> vs. Control	0.038	-0.016	0.092	0.206
	CO ₂ / <i>Ulva</i> vs. Control	-0.026	-0.080	0.028	0.494
	<i>Ulva</i> vs. CO ₂	0.097	0.038	0.155	0.002*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.032	-0.026	0.091	0.392
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.064	-0.119	-0.010	0.019*
<i>Mercenaria mercenaria</i> (large)	CO ₂ vs. Control	-0.138	-0.430	0.154	0.488
	<i>Ulva</i> vs. Control	0.407	0.115	0.699	0.008*
	CO ₂ / <i>Ulva</i> vs. Control	0.021	-0.252	0.294	0.995
	<i>Ulva</i> vs. CO ₂	0.545	0.253	0.837	0.001*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.159	-0.114	0.432	0.324
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.385	-0.658	-0.112	0.008*
<i>Crassostrea virginica</i> (small)	CO ₂ vs. Control	-0.106	-0.239	0.026	0.132
	<i>Ulva</i> vs. Control	-0.015	-0.148	0.117	0.985
	CO ₂ / <i>Ulva</i> vs. Control	-0.102	-0.245	0.042	0.202
	<i>Ulva</i> vs. CO ₂	0.091	-0.042	0.223	0.225
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.005	-0.138	0.148	1.000
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.086	-0.229	0.057	0.319
<i>Crassostrea virginica</i> (large)	CO ₂ vs. Control	-0.200	-13.950	13.551	1.000
	<i>Ulva</i> vs. Control	-6.376	-20.127	7.375	0.468
	CO ₂ / <i>Ulva</i> vs. Control	-0.869	-14.619	12.882	0.996
	<i>Ulva</i> vs. CO ₂	-6.176	-18.475	6.123	0.407
	CO ₂ / <i>Ulva</i> vs. CO ₂	-0.669	-12.968	11.630	0.998
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	5.507	-6.792	17.806	0.494
<i>Argopecten irradians</i> (small)	CO ₂ vs. Control	-0.210	-0.444	0.024	0.085
	<i>Ulva</i> vs. Control	-0.004	-0.239	0.230	1.000
	CO ₂ / <i>Ulva</i> vs. Control	-0.140	-0.374	0.094	0.331
	<i>Ulva</i> vs. CO ₂	0.205	-0.029	0.440	0.093
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.070	-0.164	0.304	0.812
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.136	-0.370	0.099	0.357
<i>Argopecten irradians</i> (large)	CO ₂ vs. Control	-0.721	-6.911	5.468	0.976
	<i>Ulva</i> vs. Control	1.257	-4.933	7.446	0.892
	CO ₂ / <i>Ulva</i> vs. Control	0.581	-6.199	7.361	0.990
	<i>Ulva</i> vs. CO ₂	1.978	-3.558	7.514	0.629
	CO ₂ / <i>Ulva</i> vs. CO ₂	1.302	-4.887	7.491	0.882
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.676	-6.865	5.513	0.980
<i>Mytilus edulis</i>	CO ₂ vs. Control	0.037	-0.115	0.188	0.890
	<i>Ulva</i> vs. Control	0.067	-0.084	0.219	0.569
	CO ₂ / <i>Ulva</i> vs. Control	0.137	-0.015	0.289	0.082
	<i>Ulva</i> vs. CO ₂	0.031	-0.121	0.183	0.929
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.101	-0.051	0.252	0.254
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	0.070	-0.082	0.221	0.545

Table S9. Tukey Honest Significant Difference tests for tissue weight-based growth for tissue weight-based growth for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (cohort)	Treatment	Difference	Lower	Upper	P-value
<i>Mercenaria mercenaria</i> (small)	CO ₂ vs. Control	-0.006	-0.016	0.003	0.233
	<i>Ulva</i> vs. Control	0.006	-0.003	0.016	0.232
	CO ₂ / <i>Ulva</i> vs. Control	0.001	-0.009	0.010	0.997
	<i>Ulva</i> vs. CO ₂	0.013	0.003	0.023	0.011*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.007	-0.002	0.016	0.143
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.006	-0.015	0.003	0.252
<i>Mercenaria mercenaria</i> (large)	CO ₂ vs. Control	-0.016	-0.033	0.001	0.070
	<i>Ulva</i> vs. Control	0.015	-0.002	0.031	0.098
	CO ₂ / <i>Ulva</i> vs. Control	-0.004	-0.020	0.012	0.851
	<i>Ulva</i> vs. CO ₂	0.030	0.013	0.047	0.002*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.012	-0.004	0.027	0.172
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.019	-0.034	-0.003	0.022*
<i>Crassostrea virginica</i> (small)	CO ₂ vs. Control	-0.023	-0.052	0.006	0.127
	<i>Ulva</i> vs. Control	0.007	-0.022	0.036	0.887
	CO ₂ / <i>Ulva</i> vs. Control	-0.015	-0.042	0.011	0.343
	<i>Ulva</i> vs. CO ₂	0.030	-0.001	0.061	0.057
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.008	-0.021	0.037	0.840
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.022	-0.051	0.007	0.150
<i>Crassostrea virginica</i> (large)	CO ₂ vs. Control	-4.693	-11.124	1.737	0.141
	<i>Ulva</i> vs. Control	-2.992	-8.862	2.878	0.341
	CO ₂ / <i>Ulva</i> vs. Control	-0.698	-7.129	5.732	0.976
	<i>Ulva</i> vs. CO ₂	1.701	-4.169	7.572	0.721
	CO ₂ / <i>Ulva</i> vs. CO ₂	3.995	-2.435	10.425	0.219
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	2.294	-3.577	8.164	0.529
<i>Argopecten irradians</i> (small)	CO ₂ vs. Control	-0.030	-0.076	0.015	0.245
	<i>Ulva</i> vs. Control	-0.016	-0.058	0.027	0.688
	CO ₂ / <i>Ulva</i> vs. Control	-0.044	-0.087	-0.002	0.040*
	<i>Ulva</i> vs. CO ₂	0.015	-0.031	0.061	0.769
	CO ₂ / <i>Ulva</i> vs. CO ₂	-0.014	-0.060	0.032	0.801
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.029	-0.071	0.014	0.236
<i>Argopecten irradians</i> (large)	CO ₂ vs. Control	-0.324	-1.246	0.599	0.546
	<i>Ulva</i> vs. Control	0.816	-0.106	1.738	0.073
	CO ₂ / <i>Ulva</i> vs. Control	0.122	-0.800	1.044	0.945
	<i>Ulva</i> vs. CO ₂	1.139	0.217	2.061	0.025*
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.446	-0.476	1.368	0.332
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	-0.694	-1.616	0.229	0.118
<i>Mytilus edulis</i>	CO ₂ vs. Control	0.006	-0.021	0.032	0.922
	<i>Ulva</i> vs. Control	0.011	-0.018	0.040	0.692
	CO ₂ / <i>Ulva</i> vs. Control	0.024	-0.003	0.051	0.080
	<i>Ulva</i> vs. CO ₂	0.005	-0.024	0.034	0.949
	CO ₂ / <i>Ulva</i> vs. CO ₂	0.019	-0.008	0.045	0.212
	CO ₂ / <i>Ulva</i> vs. <i>Ulva</i>	0.014	-0.015	0.042	0.517

Table S10. Two-way analyses of variance for total alkalinity for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), Eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of Variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	21445.146	21445.146	80.677	<0.001*
	<i>Ulva</i>	1	77.383	77.383	0.291	0.593
	CO ₂ x <i>Ulva</i>	1	1.263	1.263	0.00475	0.945
	Residual	37	9835.142	265.815		
	Total	40	31702.957	792.574		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	12167.668	12167.668	78.766	<0.001*
	<i>Ulva</i>	1	4868.925	4868.925	31.519	<0.001*
	CO ₂ x <i>Ulva</i>	1	298502.623	298502.623	1932.331	<0.001*
	Residual	30	4634.341	154.478		
	Total	33	317210.57	9612.442		
<i>Crassostrea virginica</i> (small)	CO ₂	1	94349.785	94349.785	70.625	<0.001*
	<i>Ulva</i>	1	12338.03	12338.03	9.236	0.005*
	CO ₂ x <i>Ulva</i>	1	13725.68	13725.68	10.274	0.003*
	Residual	32	42749.609	1335.925		
	Total	35	163163.104	4661.803		
<i>Crassostrea virginica</i> (large)	CO ₂	1	365185.127	365185.127	1740.652	<0.001*
	<i>Ulva</i>	1	450.572	450.572	2.148	0.151
	CO ₂ x <i>Ulva</i>	1	57698.523	57698.523	275.02	<0.001*
	Residual	36	7552.724	209.798		
	Total	39	435434.308	11164.982		
<i>Argopecten irradians</i> (small)	CO ₂	1	43126.683	43126.683	108.315	<0.001*
	<i>Ulva</i>	1	73322.882	73322.882	184.155	<0.001*
	CO ₂ x <i>Ulva</i>	1	9647.501	9647.501	24.23	<0.001*
	Residual	28	11148.464	398.159		
	Total	31	137245.529	4427.275		
<i>Argopecten irradians</i> (large)	CO ₂	1	52935.913	52935.913	521.079	<0.001*
	<i>Ulva</i>	1	35280.605	35280.605	347.287	<0.001*
	CO ₂ x <i>Ulva</i>	1	14073.663	14073.663	138.535	<0.001*
	Residual	48	4876.275	101.589		
	Total	51	107166.457	2101.303		
<i>Mytilus edulis</i>	CO ₂	1	39973.607	39973.607	37.22	<0.001*
	<i>Ulva</i>	1	58814.526	58814.526	54.764	<0.001*
	CO ₂ x <i>Ulva</i>	1	26759.68	26759.68	24.917	<0.001*
	Residual	32	34367.021	1073.969		
	Total	35	168107.844	4803.081		

Table S11. Two-way analyses of variance for OH⁻ concentrations for smaller and larger cohorts of hard clams (*Mercenaria mercenaria*), eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), and blue mussels (*Mytilus edulis*). Asterisks next to p-values represent significant results.

Species (size class)	Source of Variation	DF	SS	MS	F	P
<i>Mercenaria mercenaria</i> (small)	CO ₂	1	172.479	172.479	1029.599	<0.001*
	<i>Ulva</i>	1	1.023	1.023	6.109	0.018*
	CO ₂ x <i>Ulva</i>	1	0.574	0.574	3.425	0.072
	Residual	37	6.198	0.168		
	Total	40	179.932	4.498		
<i>Mercenaria mercenaria</i> (large)	CO ₂	1	56.09	56.09	911.005	<0.001*
	<i>Ulva</i>	1	1.328	1.328	21.564	<0.001*
	CO ₂ x <i>Ulva</i>	1	1.118	1.118	18.159	<0.001*
	Residual	30	1.847	0.0616		
	Total	33	59.195	1.794		
<i>Crassostrea virginica</i> (small)	CO ₂	1	212.983	212.983	199.46	<0.001*
	<i>Ulva</i>	1	7.62	7.62	7.136	0.012*
	CO ₂ x <i>Ulva</i>	1	6.629	6.629	6.208	0.018*
	Residual	32	34.17	1.068		
	Total	35	261.401	7.469		
<i>Crassostrea virginica</i> (large)	CO ₂	1	49.25	49.25	464.178	<0.001*
	<i>Ulva</i>	1	0.498	0.498	4.698	0.037*
	CO ₂ x <i>Ulva</i>	1	0.325	0.325	3.066	0.088
	Residual	37	3.926	0.106		
	Total	40	54.324	1.358		
<i>Argopecten irradians</i> (small)	CO ₂	1	67.22	67.22	264.944	<0.001*
	<i>Ulva</i>	1	1.187	1.187	4.68	0.040*
	CO ₂ x <i>Ulva</i>	1	0.918	0.918	3.618	0.068
	Residual	26	6.597	0.254		
	Total	29	77.278	2.665		
<i>Argopecten irradians</i> (large)	CO ₂	1	103.532	103.532	2999.894	<0.001*
	<i>Ulva</i>	1	0.181	0.181	5.255	0.026*
	CO ₂ x <i>Ulva</i>	1	0.0825	0.0825	2.39	0.129
	Residual	48	1.657	0.0345		
	Total	51	105.452	2.068		
<i>Mytilus edulis</i>	CO ₂	1	72.466	72.466	111.682	<0.001*
	<i>Ulva</i>	1	2.977	2.977	4.588	0.040*
	CO ₂ x <i>Ulva</i>	1	1.869	1.869	2.88	0.100
	Residual	31	20.115	0.649		
	Total	34	103.361	3.04		

Table S12. One-way analysis of variance for growth rates of *Ulva* exposed to ambient and elevated CO₂ conditions for June through November experiments.

Source of Variation	DF	SS	MS	F	P
Between Groups	1	0.0267	0.0267	4.264	0.041
Residual	111	0.695	0.00626		
Total	112	0.722			

Figure S1. Mean growth rates of *Ulva* exposed to ambient and elevated CO₂ conditions for June through November experiments.

