

Figure S1. Time series of seawater (a) pH and (b) temperature at study locations in 2011 (Lompoc) and 2013 (Soberanes and Hopkins). Lompoc intertidal pH is approximated with pH data from an offshore mooring at Purisima (34.73, -120.63).

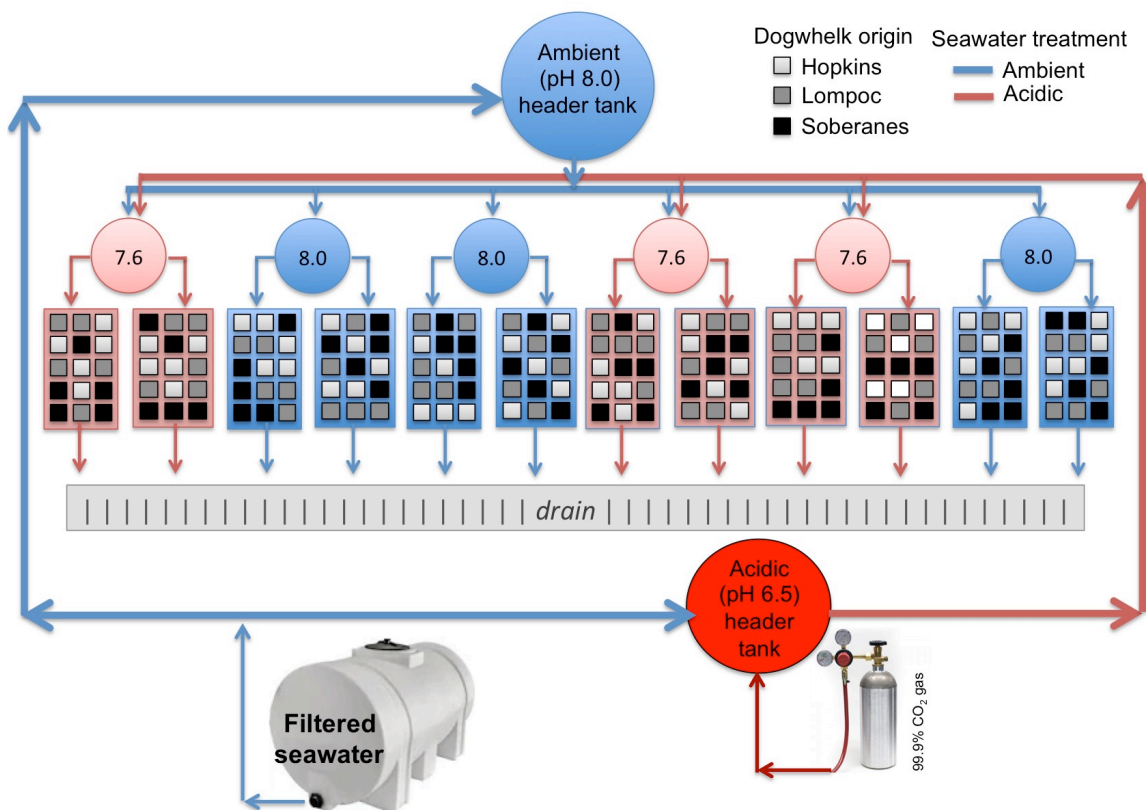


Figure S2. Diagram of experimental setup with carbonate chemistry manipulation. Red indicates acidified seawater and blue indicates ambient seawater. Red and blue circles labeled with pH are header barrels where pH was manipulated and Durafets continuously recorded pH. Water from header barrels flowed to rectangular bins each with 15 dogwhelks from the three populations

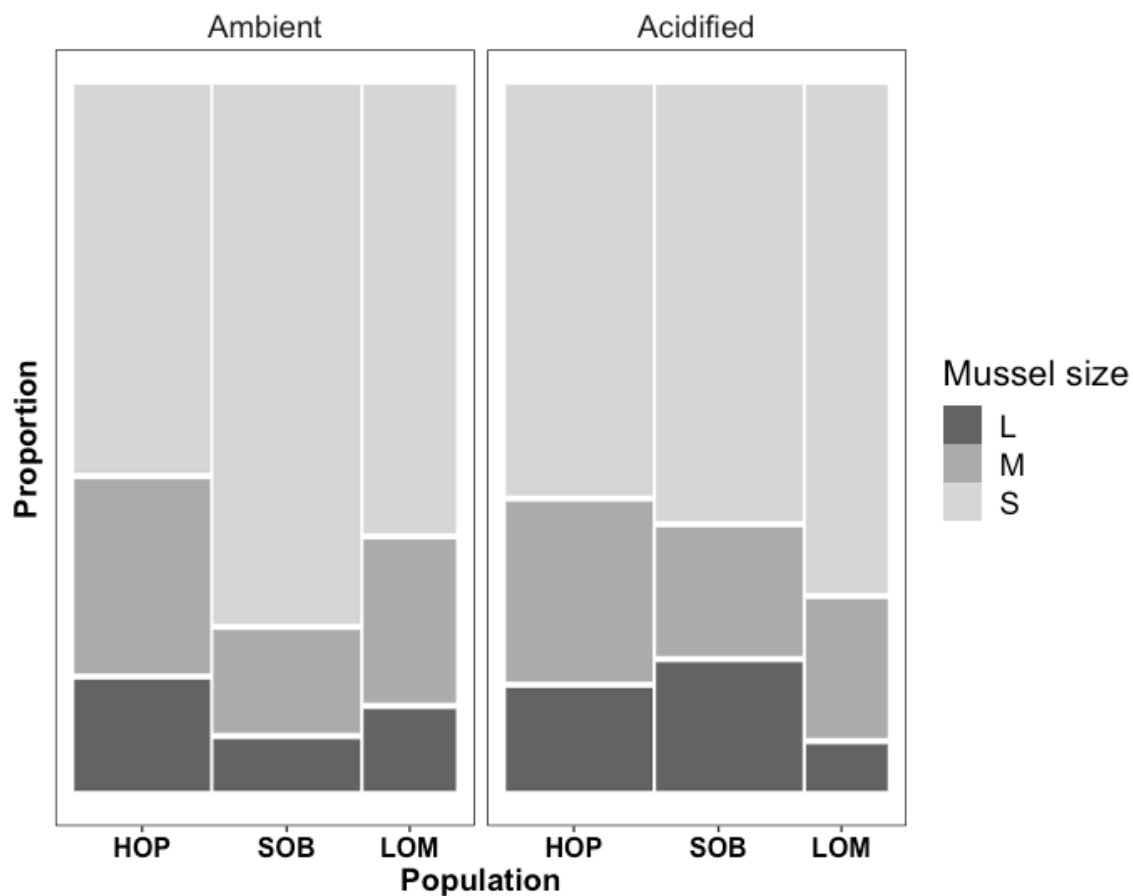


Figure S3. Proportion of each size of mussel drilled by dogwhelk population and pH treatment. Bar widths indicate sample sizes

Table S1. Extended summary of seawater pH and temperature conditions for all sites July through September

Population	Mean.pH	Median.pH	Min.pH	Max.pH	SD.pH	FreqBelow7.6	FreqBelow7.7	FreqBelow7.8
Hopkins	8.103	8.101	7.598	8.514	0.149	0.000	0.007	0.026
Soberanes	8.020	8.027	7.497	8.289	0.126	0.007	0.018	0.051
Lompoc	7.966	7.973	7.670	8.245	0.117	0.000	0.001	0.082

Population	Mean.sw.temp	Median.sw.temp	Min.sw.temp	Max.sw.temp	SD.sw.temp	percentile.90.sw.temp
Hopkins	15.107	14.94	13.00	20.27	0.990	16.57
Soberanes	12.384	12.38	10.28	15.04	0.854	13.52
Lompoc	13.136	12.98	11.40	15.99	0.969	14.59

Hopkins and Soberanes data are from intertidal sensors in 2013, and Lompoc data are from an offshore sensor (Purisima) in 2011. Units for temperature are degrees Celsius. Descriptions of environmental regimes at these sites can also be found in Hofmann et al. 2014, Kroeker et al. 2016, and Chan et al. 2017

Table S2. Header barrel and bin comparisons. pH and temperature in header barrels were measured continuously in 15 s intervals with Durafet pH sensors. Bin pH was measured using bottle samples taken every twelfth day following the guide to best practices for ocean CO2 measurements (Dickson 2007). Bin temperature was measured continuously in 15 min intervals with temperature loggers. Values are mean ± standard error

Treatment	Header barrel		Experimental bin	
	pH	Temperature (C)	pH	Temperature (C)
Ambient	8.03 ± 0.00	13.81 ± 0.00	7.99 ± 0.01	13.96 ± 0.04
Acidified	7.60 ± 0.00	13.80 ± 0.00	7.66 ± 0.01	13.90 ± 0.04

Table S3. Mean dogwhelk length (mm) and weights (g) of each population at the start of the experiment

Population	N	Length	SD	Total wet	SD	Buoyant	SD	Est.body	SD
HOP	60	23.381	1.511	2.536	0.473	1.056	0.226	1.480	0.261
SOB	60	22.966	2.395	2.355	0.740	0.913	0.283	1.443	0.465
LOM	53	22.876	2.736	2.546	0.813	1.000	0.327	1.547	0.542

Table S4. Mean dogwhelk length (mm) and weights (g) in each pH treatment at the start of the experiment

pH treatment	N	Length	SD	Total wet	SD	Shell	SD	Body	SD
Ambient	86	22.900	2.090	2.39	0.659	0.956	0.263	1.435	0.408
Acidic	87	23.262	2.389	2.56	0.706	1.021	0.301	1.538	0.453

Table S5. Mean dogwhelk length (mm) and weights (g) in each bin at the start of the experiment

Bin	N	Length	SD	Total wet	SD	Shell	SD	Body	SD
2a	15	23.275	2.711	2.556	0.834	1.035	0.335	1.521	0.512
2b	14	23.862	2.446	2.700	0.783	1.079	0.303	1.621	0.488
3a	14	23.164	1.432	2.355	0.432	0.924	0.194	1.431	0.253
3b	14	22.463	2.166	2.273	0.640	0.922	0.239	1.351	0.406
4a	15	22.257	1.900	2.165	0.571	0.853	0.247	1.312	0.333
4b	15	23.723	2.720	2.691	0.871	1.067	0.335	1.623	0.553
5a	14	23.416	1.813	2.559	0.618	1.034	0.259	1.525	0.366
5b	15	23.142	2.343	2.487	0.559	0.993	0.207	1.494	0.367
6a	14	22.342	2.393	2.438	0.721	1.008	0.347	1.430	0.385
6b	15	23.525	2.639	2.621	0.777	0.985	0.371	1.637	0.590
7a	14	23.628	1.645	2.648	0.629	1.073	0.255	1.575	0.387
7b	14	22.208	2.134	2.225	0.636	0.901	0.242	1.324	0.401

Table S6. Analysis of deviance (type III) on ordered regression mixed model for size of mussel drilled

	LR Chisq	Df	Pr(>Chisq)
pH treatment	0.000	1	1.000
Population	0.000	2	1.000
pH treatment * Population	1.928	2	0.381

Random effect of bin had variance 0.13