The following supplement accompanies the article

Development of *Euphausia pacifica* (krill) larvae is impaired under pCO_2 levels currently observed in the Northeast Pacific

Anna K. McLaskey*, Julie E. Keister, Paul McElhany, M. Brady Olson, D. Shallin Busch, Michael Maher, Amanda K. Winans

*Corresponding author: mclaskey@uw.edu

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Table S1. Treatment conditions of individual jars during Experiment 1. Measured temperature (˚C), salinity, total alkalinity (µmol/kg), pH (by spectrophotometry), and calculated pCO_2 (µatm) and DIC (µmol/kg), with the standard deviation of 4 measurements (except trial 2, which had three measurements).

Trial	Target pCO_2	# Broods	Temp	Salinity	Alkalinity	pH	pCO_2	DIC
1	400	5	12.2	29.1	2030	7.86 ± 0.03	599 ± 40	1941 ± 8
	400		12.2			7.87 ± 0.03	576 ± 50	1936 ± 10
	400		12.2			7.86 ± 0.04	597 ± 58	1941 ± 12
	400		12.2			7.89 ± 0.04	551 ± 52	1931 ± 12
	400		12.2			7.85 ± 0.03	607 ± 41	1943 ± 8
4	400	4	12.3	30.0	2021	7.86 ± 0.04	586 ± 59	1927 ± 13
	400		12.3			7.89 ± 0.04	544 ± 49	1918 ± 12
	400		12.3			7.91 ± 0.05	526 ± 64	1913 ± 16
	400		12.3			7.9 ± 0.03	533 ± 47	1915 ± 10
5	400	10	12.1	29.5	2029	7.9 ± 0.04	533 ± 50	1924 ± 10
	400		12.2			7.88 ± 0.02	567 ± 28	1934 ± 6
	400		12.1			7.87 ± 0.02	571 ± 22	1933 ± 4
	400		12.2			7.86 ± 0.02	587 ± 26	1935 ± 4
	400		12.2			7.9 ± 0.03	542 ± 45	1927 ± 9
	400		12.2			7.88 ± 0.01	558 ± 10	1931 ± 4
	400		12.2			7.89 ± 0.02	555 ± 22	1930 ± 5
	400		12.2			7.86 ± 0.04	595 ± 52	1938 ± 7
	400		12.2			7.89 ± 0.03	556 ± 38	1930 ± 7
	400		12.2			7.89 ± 0.03	549 ± 43	1928 ± 9
2	800	4	12.2	29.2	2022	7.68 ± 0.07	932 ± 177	1988 ± 41
	800		12.1			7.71 ± 0.06	868 ± 128	1980 ± 37
	800		12.2			7.69 ± 0.07	912 ± 178	1985 ± 39
	800		12.3			7.63 ± 0.05	1056 ± 113	2002 ± 10
3	800	10	12.6	29.2	2022	7.66 ± 0.01	982 ± 29	1995 ± 21
	800		12.6			7.62 ± 0.02	1090 ± 55	2006 ± 16
	800		12.5			7.63 ± 0.04	1050 ± 105	2002 ± 23
	800		12.6			7.64 ± 0.02	1036 ± 71	2001 ± 25
	800		12.6			7.6 ± 0.04	1138 ± 115	2011 ± 28
	800		12.6			7.64 ± 0.02	1033 ± 65	2000 ± 23
	800		12.7			7.66 ± 0.02	981 ± 52	1995 ± 21
	800		13.1			7.65 ± 0.03	1003 ± 77	1997 ± 23
	800		12.6			7.64 ± 0.02	1020 ± 43	1999 ± 21
	800		13.2			7.64 ± 0.01	1034 ± 20	2001 ± 16

5	1600	9	12.3	29.5	2029	7.37 ± 0.03	1938 ± 130	2070 ± 6
	1600		12.2			7.38 ± 0.02	1922 ± 69	2069 ± 5
	1600		12.3			7.39 ± 0.03	1889 ± 129	2067 ± 11
	1600		12.3			7.42 ± 0.03	1745 ± 109	2058 ± 7
	1600		12.2			7.4 ± 0.01	1830 ± 36	2063 ± 7
	1600		12.3			7.39 ± 0.01	1861 ± 59	2065 ± 6
	1600		12.3			7.43 ± 0.03	1696 ± 137	2053 ± 8
	1600		12.3			7.41 ± 0.01	1772 ± 55	2059 ± 3
	1600		12.4			7.4 ± 0.02	1845 ± 106	2064 ± 5
2	2400	5	12.2	29.2	2022	7.27 ± 0.04	2469 ± 251	2100 ± 34
	2400		12.2			7.28 ± 0.04	2442 ± 201	2098 ± 24
	2400		12.2			7.28 ± 0.04	2416 ± 253	2097 ± 30
	2400		12.3			7.3 ± 0.02	2297 ± 129	2090 ± 23
	2400		12.2			7.29 ± 0.03	2364 ± 191	2094 ± 30
3	2400	5	12.9	29.2	2022	7.25 ± 0.06	2611 ± 386	2107 ± 25
	2400		13.4			7.28 ± 0.08	2486 ± 469	2100 ± 30
	2400		13.1			7.26 ± 0.1	2597 ± 650	2106 ± 43
	2400		13.2			7.24 ± 0.05	2668 ± 314	2111 ± 33
	2400		12.8			7.24 ± 0.11	2742 ± 740	2113 ± 24
1	3200	1	12.2	29.1	2030	7.08 ± 0.04	3890 ± 358	2173 ± 17
4	3200	4	12.3	30.0	2021	7.1 ± 0.06	3692 ± 543	2153 ± 26
	3200		12.3			7.09 ± 0.04	3760 ± 315	2156 ± 15
	3200		12.3			7.07 ± 0.06	3971 ± 555	2166 ± 26
	3200		12.4			7.09 ± 0.02	3758 ± 217	2156 ± 10

Table S2. AICc scores for generalized linear mixed effects models of hatching, development, and survival with $[H^+]$ concentration for Experiment 1. Best model indicated in **bold**.

Experiment 1	Hatching	Development	Survival
Response= (brood) + intercept	**505**	307	287
Response= (trial) + intercept	2833	1826	551
Response= [H+] + (brood) + intercept	508	291	283
Response= [H+] + (trial) + intercept	2623	588	366
Response= [H+] + (trial) + (brood) + intercept	510	**288**	**280**
Response= [H+] + (trial) + (brood) + [H+]*(brood) + intercept	512	291	282
Response= [H+] + (trial) + (brood) + [H+]*(trial) + intercept	512	291	282
Response= [H+] + (trial) + (brood) + [H+]*(trial)+ [H+]*(brood) + intercept	515	293	285

Table S3. Treatment conditions during each trial of Experiment 2. Average conditions grouped by target pCO_2 (µatm) treatment and experimental trial with the standard deviation of (n) measurements. Temperature, salinity, DIC, and pH were measured; alkalinity and pCO_2 were calculated.

	Target pCO_2	**Trial**	**Source water**	**Egg Jars**	**Larvae dishes**
Temperature	400	1		12.1 ± 0.2 (19)	12.1 ± 0.7 (135)
		2		12.0 ± 0.0 (5)	12.2 ± 0.5 (119)
		3		12.4 ± 0.4 (15)	12.2 ± 0.3 (142)
	800	1		12.2 ± 0.3 (11)	12.2 ± 0.8 (159)
		2		12.0 (1)	12.2 ± 0.4 (26)
		3		12.3 ± 0.4 (28)	12.4 ± 0.4 (266)

	1200	1		11.9 ± 0.2 (19)	12.4 ± 0.9 (142)
		2		12.3 ± 0.3 (13)	12.2 ± 0.5 (177)
		3		12.5 ± 0.4 (10)	12.2 ± 0.5 (69)
Salinity	400	1	30 ± 0.8 (11)	31 ± 1.5 (4)	32 ± 3 (13)
		2	31 ± 1.2 (20)	31 ± 0.7 (2)	34 ± 1.1 (22)
		3	31 ± 1.2 (18)	32 ± 0.6 (4)	34 ± 1.1 (14)
	800	1	30 ± 0.8 (11)	31 ± 1.5 (4)	33 ± 3.3 (13)
		2	31 ± 1.3 (20)	30 ± 0 (2)	33 ± 1.4 (19)
		3	31 ± 1.4 (18)	32 ± 0.5 (6)	33 ± 1.4 (15)
	1200	1	30 ± 0.8 (11)	30 ± 0 (4)	32 ± 2.5 (13)
		2	31 ± 1.0 (20)	31.2 ± 1.1 (5)	34 ± 2.6 (22)
		3	31 ± 1.0 (18)	31 ± 1.4 (2)	35 ± 2.8 (14)
Alkalinity	400	1	2075 ± 33 (11)	2158 ± 61 (4)	2215 ± 111 (13)
		2	2065 ± 65 (20)	2062 ± 6 (2)	2265 ± 90 (22)
		3	2066 ± 68 (18)	2066 ± 28 (4)	2279 ± 111 (14)
	800	1	2075 ± 35 (11)	2205 ± 64 (4)	2240 ± 117 (13)
		2	2050 ± 44 (20)	2064 ± 20 (2)	2215 ± 72 (19)
		3	2050 ± 46 (18)	2055 ± 27 (6)	2187 ± 76 (15)
	1200	1	2062 ± 37 (11)	2216 ± 78 (4)	2190 ± 101 (13)
		2	2042 ± 33 (20)	2077 ± 14 (5)	2305 ± 136 (21)
		3	2044 ± 34 (18)	2045 ± 6 (2)	2354 ± 149 (13)
DIC	400	1	1936 ± 28 (11)	2039 ± 38 (4)	2071 ± 90 (13)
		2	1928 ± 57 (20)	1957 ± 2 (2)	2112 ± 75 (22)
		3	1928 ± 60 (18)	1960 ± 31 (4)	2128 ± 90 (14)
	800	1	2025 ± 24 (11)	2145 ± 57 (4)	2180 ± 103 (13)
		2	1995 ± 39 (20)	2028 ± 1 (2)	2158 ± 65 (19)
		3	1992 ± 41 (18)	2009 ± 28 (6)	2133 ± 66 (15)
	1200	1	2047 ± 31 (11)	2205 ± 76 (4)	2175 ± 89 (13)
		2	2020 ± 32 (20)	2071 ± 13 (5)	2266 ± 130 (22)
		3	2020 ± 34 (18)	2034 ± 1 (2)	2308 ± 142 (14)
pH	400	1	7.99 ± 0.01 (11)	7.92 ± 0.05 (4)	7.96 ± 0.04 (13)
		2	7.98 ± 0.01 (20)	7.89 ± 0.02 (2)	7.96 ± 0.05 (22)
		3	7.98 ± 0.01 (18)	7.88 ± 0.02 (4)	7.95 ± 0.06 (14)
	800	1	7.72 ± 0.04 (11)	7.73 ± 0.02 (4)	7.7 ± 0.02 (13)
		2	7.72 ± 0.03 (20)	7.66 ± 0.07 (2)	7.69 ± 0.03 (19)
		3	7.72 ± 0.02 (18)	7.68 ± 0.02 (6)	7.68 ± 0.03 (15)
	1200	1	7.58 ± 0.03 (11)	7.57 ± 0.01 (4)	7.56 ± 0.04 (13)

		2	7.59 ± 0.04 (20)	7.53 ± 0.05 (5)	7.60 ± 0.04 (21)
		3	7.60 ± 0.03 (18)	7.56 ± 0.01 (2)	7.58 ± 0.05 (13)
pCO_2	400	1	430 ± 11 (11)	540 ± 64 (4)	488 ± 43 (13)
		2	438 ± 18 (20)	554 ± 26 (2)	496 ± 75 (22)
		3	438 ± 18 (18)	565 ± 35 (4)	516 ± 87 (14)
	800	1	871 ± 80 (11)	883 ± 26 (4)	949 ± 39 (13)
		2	842 ± 51 (20)	989 ± 154 (2)	959 ± 47 (19)
		3	831 ± 40 (18)	925 ± 56 (6)	968 ± 66 (15)
	1200	1	1186 ± 77 (11)	1327 ± 24 (4)	1325 ± 126 (13)
		2	1141 ± 100 (20)	1341 ± 166 (5)	1256 ± 137 (21)
		3	1120 ± 79 (18)	1244 ± 52 (2)	1316 ± 130 (13)

Table S4. AICc scores for generalized linear mixed effects models of hatching, development, and survival with $[H^+]$ concentration for larvae raised to five days post hatch in Experiment 2. Best model indicated in **bold**.

Experiment 2 (five days post hatch)	Hatching	Development	Survival
Response= (brood) + intercept	**599**	458	**266**
Response= (trial) + intercept	3207	3187	459
Response= [H+] + (brood) + intercept	**599**	458	268
Response= [H+] + (trial) + intercept	3149	3070	449
Response= [H+] + (trial) + (brood) + intercept	601	**454**	271
Response= [H+] + (trial) + (brood) + [H+]*(brood) + intercept	604	456	273
Response= [H+] + (trial) + (brood) + [H+]*(trial) + intercept	604	456	273
Response= [H+] + (trial) + (brood) + [H+]*(trial)+ [H+]*(brood) + intercept	606	459	276

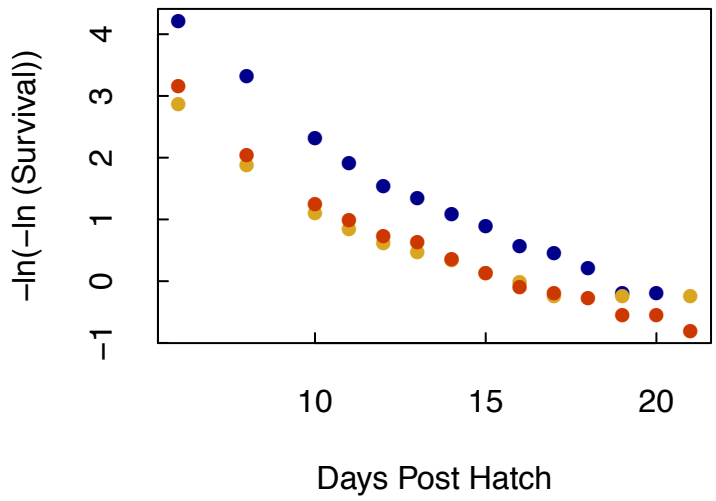

Fig S1. Visual examination of proportional hazards assumption in Experiment 2 survival data showing approximately parallel –ln(–ln) survival among treatments (blue is target treatment 400 µatm pCO_2, yellow 800 µatm, red 1200 µatm) until after Day 17, when n becomes very small.