

Vulnerability of early life stage Northwest Atlantic forage fish to ocean acidification and low oxygen

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Table S1. Seawater chemistry for first *Menidia beryllina* acidification and hypoxia experiment. Mean and standard deviation for temperature ($^{\circ}\text{C}$), pH (total scale), dissolved oxygen (mg l^{-1}), pCO_2 (μatm), total alkalinity ($\mu\text{mol kg}^{-1}$), CO_3^{2-} ($\mu\text{mol kg}^{-1}$), and total dissolved inorganic carbon ($\mu\text{mol kg}^{-1}$).

	Control	Low DO	Low pH	Low pH, Low DO
Temperature	21.9 (0.2)	21.9 (0.2)	21.9 (0.2)	21.9 (0.2)
pH_T	7.92 (0.02)	7.96 (0.01)	7.39 (0.01)	7.40 (0.01)
DO	9.02 (0.03)	1.53 (0.29)	8.95 (0.02)	1.62 (0.11)
pCO₂	549 (9)	511 (28)	2187 (72)	2135 (99)
Ω calcite	3.84 (0.35)	3.96 (0.18)	1.26 (0.07)	1.22 (0.10)
Ω aragonite	2.49 (0.23)	2.57 (0.12)	0.82 (0.04)	0.79 (0.07)
TA	2290 (72)	2270 (62)	2310 (86)	2240 (79)
CO₃²⁻	158 (13)	163 (7)	51.8 (2.6)	50.2 (3.6)
DIC	2080 (57)	2050 (56)	2300 (88)	2240 (80)
Salinity	32.5 (0.5)	32.5 (0.5)	32.5 (0.5)	32.5 (0.5)

Table S2. Seawater chemistry for second *Menidia beryllina* acidification and hypoxia experiment. Mean and standard deviation for temperature ($^{\circ}\text{C}$), pH (total scale), dissolved oxygen (mg l^{-1}), pCO_2 (μatm), total alkalinity ($\mu\text{mol kg}^{-1}$), CO_3^{2-} ($\mu\text{mol kg}^{-1}$), and total dissolved inorganic carbon ($\mu\text{mol kg}^{-1}$).

	Control	Low DO	Low pH	Low pH, Low DO
Temperature	21.1 (0.3)	21.1 (0.3)	21.1 (0.3)	21.1 (0.3)
pH_T	7.89 (0.00)	7.92 (0.01)	7.40 (0.02)	7.40 (0.01)
DO	9.01 (0.02)	2.70 (0.06)	8.95 (0.01)	2.66 (0.17)
pCO₂	577 (41)	543 (53)	1954 (180)	2027 (242)
Ω calcite	3.82 (0.28)	3.95 (0.30)	1.40 (0.06)	1.40 (0.20)
Ω aragonite	2.48 (0.18)	2.56 (0.20)	0.91 (0.04)	0.91 (0.13)
TA	2310 (80)	2290 (67)	2280 (122)	2320 (148)
CO₃²⁻	156 (11)	161 (12)	57.2 (2.3)	57.2 (7.9)
DIC	2110 (76)	2080 (69)	2260 (128)	2300 (148)
Salinity	32	32	32	32

Table S3. Seawater chemistry for May *Menidia menidia* acidification and hypoxia experiment. Mean and standard deviation for temperature ($^{\circ}\text{C}$), pH (total scale), dissolved oxygen (mg l^{-1}), pCO_2 (μatm), total alkalinity ($\mu\text{mol kg}^{-1}$), CO_3^{2-} ($\mu\text{mol kg}^{-1}$), and total dissolved inorganic carbon ($\mu\text{mol kg}^{-1}$).

	Control	Low DO	Low pH	Low pH, Low DO
Temperature	23.9 (0.2)	23.9 (0.2)	23.9 (0.2)	23.9 (0.2)
pH_T	7.85 (0.01)	7.87 (0.02)	7.48 (0.01)	7.47 (0.01)
DO	8.56 (0.04)	2.71 (0.34)	8.52 (0.03)	2.41 (0.01)
pCO₂	560 (4)	530 (2)	1599 (68)	1701 (38)
Ω calcite	3.36 (0.52)	3.27 (0.44)	1.31 (0.16)	1.19 (0.10)
Ω aragonite	2.16 (0.35)	2.11 (0.30)	0.84 (0.11)	0.76 (0.07)
TA	2030 (180)	1960 (145)	1930 (76)	1890 (56)
CO₃²⁻	132 (23)	129 (20)	51.4 (7.1)	46.7 (4.7)
DIC	1860 (150)	1790 (118)	1910 (64)	1880 (47)
Salinity	29.5 (0.5)	29.5 (0.5)	29.5 (0.5)	29.5 (0.5)

Table S4. Seawater chemistry for June *Menidia menidia* acidification and hypoxia experiment. Mean and standard deviation for temperature (°C), pH (total scale), dissolved oxygen (mg l⁻¹), pCO₂ (µatm), total alkalinity (µmol kg⁻¹), CO₃²⁻ (µmol kg⁻¹), and total dissolved inorganic carbon (µmol kg⁻¹).

	Control	Low DO	Low pH	Low pH, Low DO
Temperature	24.4 (0.5)	24.4 (0.5)	24.4 (0.5)	24.4 (0.5)
pH_T	7.85 (0.01)	7.88 (0.01)	7.44 (0.01)	7.45 (0.01)
DO	8.50 (0.03)	2.55 (0.26)	8.40 (0.03)	2.36 (0.05)
pCO₂	555 (2)	530 (2)	1726 (112)	1787 (84)
Ω calcite	3.12 (0.18)	3.03 (0.10)	1.19 (0.01)	1.17 (0.08)
Ω aragonite	2.01 (0.13)	1.95 (0.08)	0.76 (0.00)	0.75 (0.06)
TA	1940 (50)	1870 (22)	1900 (30)	1920 (94)
CO₃²⁻	122 (8)	118 (5)	46.3 (0.0)	45.9 (3.6)
DIC	1780 (37)	1720 (13)	1880 (33)	1910 (92)
Salinity	26	26	26	26

Table S5. Seawater chemistry for *Cyprinodon variegatus* acidification and hypoxia experiment. Mean and standard deviation for temperature (°C), pH (total scale), dissolved oxygen (mg l⁻¹), pCO₂ (µatm), total alkalinity (µmol kg⁻¹), CO₃²⁻ (µmol kg⁻¹), and total dissolved inorganic carbon (µmol kg⁻¹).

	Control	Low DO	Low pH	Low pH, Low DO
Temperature	24.0 (0.4)	24.0 (0.4)	24.0 (0.4)	24.0 (0.4)
pH_T	7.90 (0.02)	7.94 (0.01)	7.46 (0.01)	7.46 (0.00)
DO	8.53 (0.02)	2.41 (0.10)	8.39 (0.08)	2.36 (0.10)
pCO₂	483 (2)	452 (8)	1633 (69)	1705 (102)
Ω calcite	3.99 (0.11)	3.95 (0.38)	1.43 (0.12)	1.42 (0.06)
Ω aragonite	2.61 (0.08)	2.58 (0.26)	0.93 (0.08)	0.93 (0.04)
TA	2100 (42)	2040 (133)	2020 (127)	2050 (103)
CO₃²⁻	162 (6)	161 (17)	58.3 (5.4)	57.7 (3.1)
DIC	1880 (32)	1810 (110)	1990 (122)	2020 (102)
Salinity	31.6 (0.5)	31.6 (0.5)	31.6 (0.5)	31.6 (0.5)