Supplementary Information

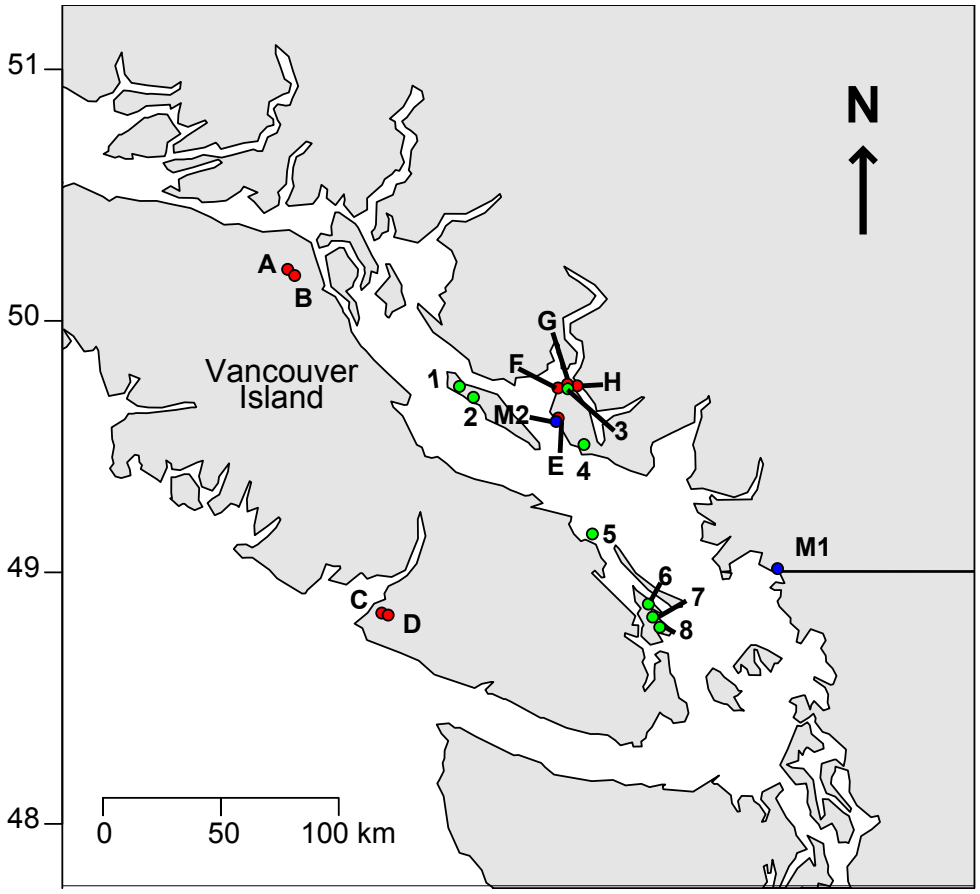


Figure S1: Map of sampling locations. Lakes 1-8 contain only stickleback, A-H indicates lakes that contain stickleback and sculpin. M1 and M2 are marine populations. The lakes are (1) Kirk, (2) Cranby, (3) Klein, (4) Trout, (5) Hoggan, (6) Bullocks, (7) Blackburn, (8) Stowell, (A) Cedar, (B) Ormond, (C) Pachena, (D) Rosseau, (E) Paq, (F) Ambrose, (G) North, (H) Brown, (M1) Little Campbell, (M2) Oyster Bay

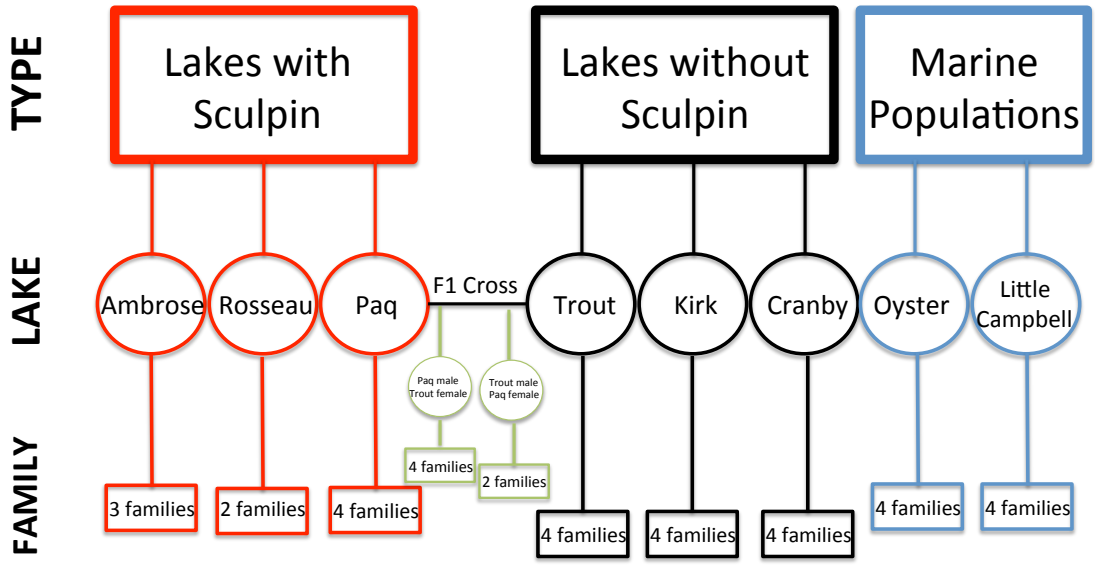


Figure S2: Schematic of crosses used in the common garden experiment. Four crosses were created for each lake. One Ambrose clutch, one Rosseau, and two F1 clutches did not hatch. An additional family from Rosseau Lake was excluded when a sculpin consumed the experimental stickleback.

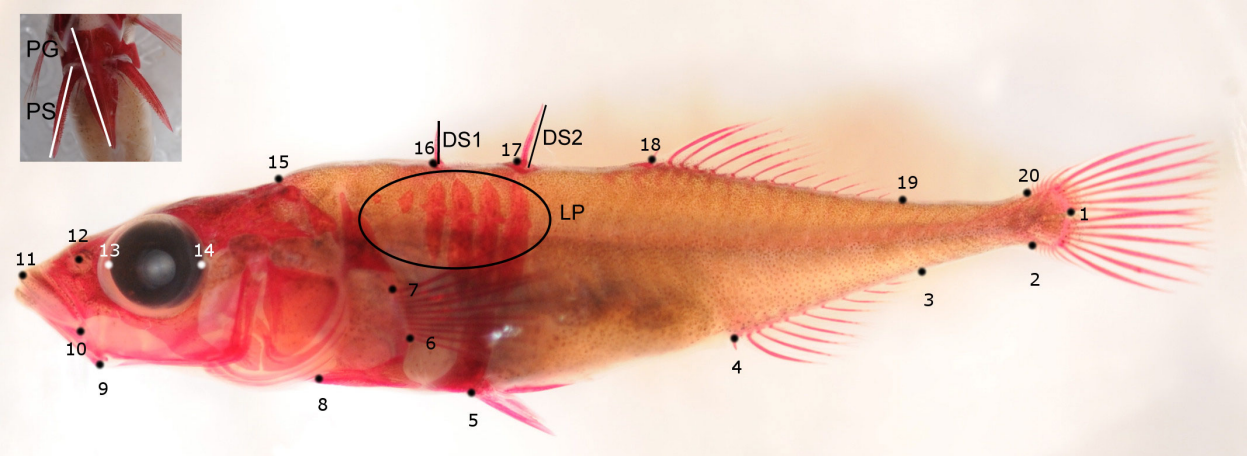


Figure S3: Landmarks coordinates used for morphometrics and armor traits (Ingram et al. 2012). First dorsal spine (DS1), second dorsal spine (DS2), pelvic spine (PS), pelvic girdle (PG), and lateral plates (LP).

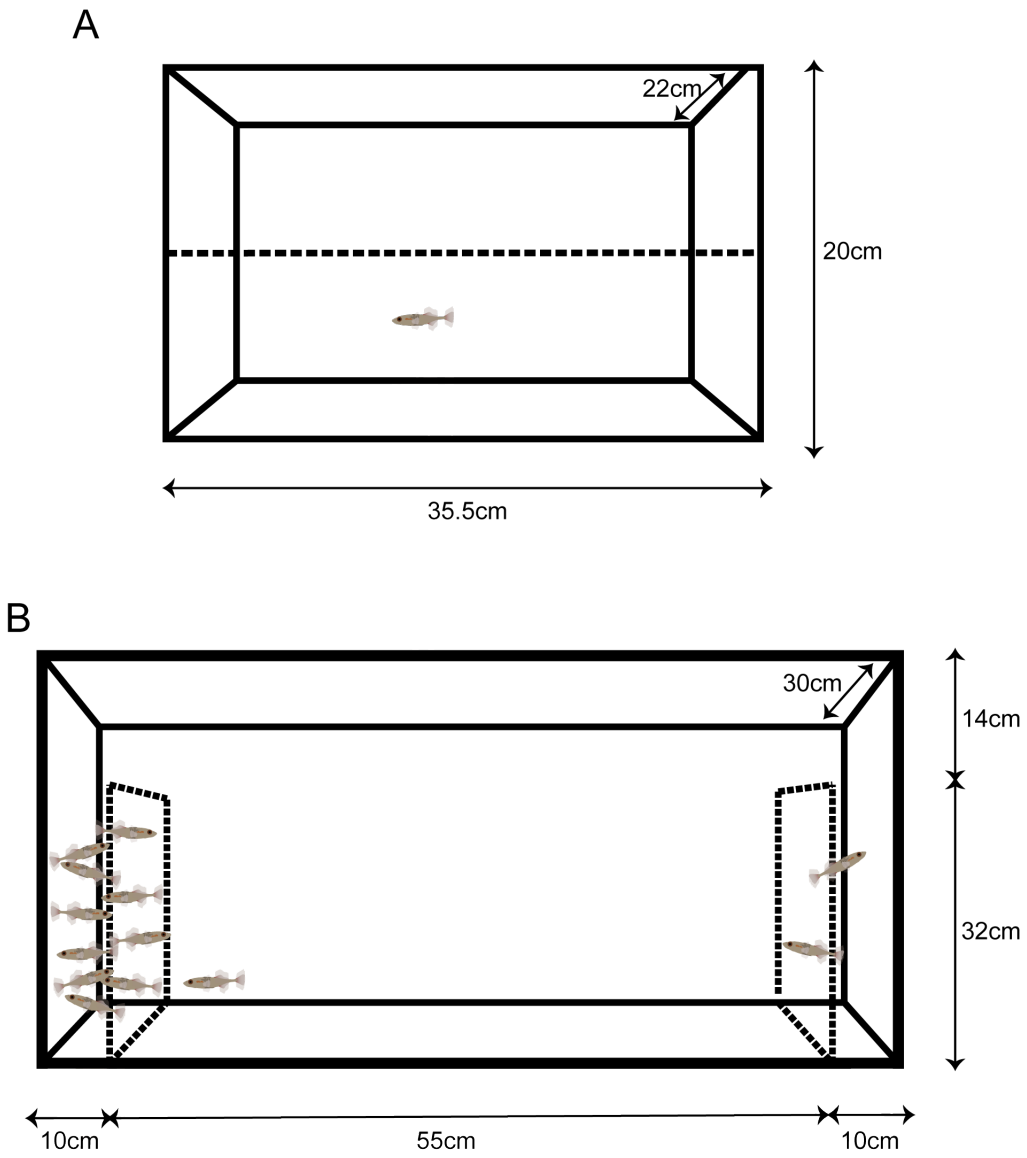
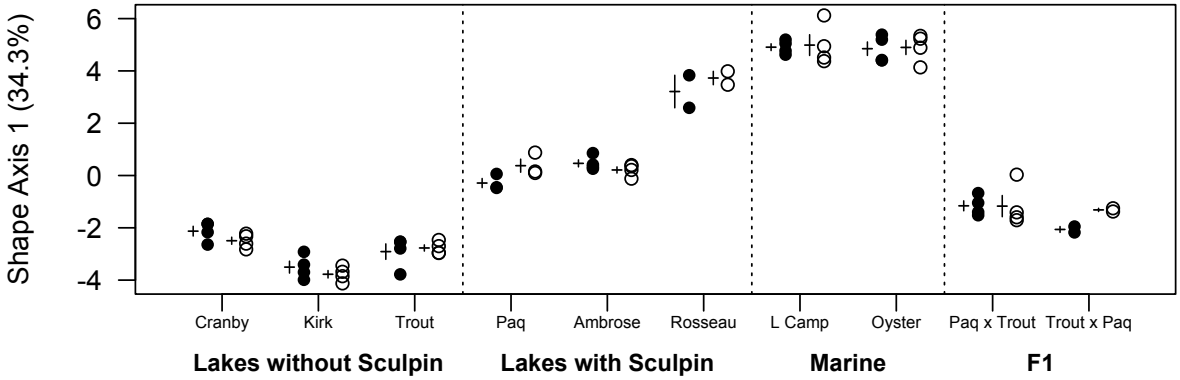


Figure S4: The set-up for behavioral assays. (A) Water column preference assay tank. A focal stickleback is introduced into an unfamiliar 15L tank. Vertical position and distance traveled were measured. (B) Shoaling Assay Tank. We created two side compartments by attaching window screen 10cm from either end of a 100L tank. The tank was filled with 32cm of water. An experimental shoal with 10 stickleback was introduced into one end compartment and two stickleback were added to the other end compartment. A focal fish was introduced to the center arena and horizontal position and distance traveled were measured. The back and sides of the assay tanks were covered with white paper to reduce external visual cues, and tanks were backlit to increase the contrast between the focal fish and the background. All trials were recorded using wireless cameras (D-link DSC-932L).



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44 Figure S5: Mean value of shape axis 1 from stickleback families reared in a common garden
45 in a control treatment (filled) and a sculpin treatment (open). The F1 is a cross between
46 fish from Trout (sculpin absent) and Paq (sculpin present) Lakes. For F1 crosses, the
47 father's population is first and the mother's population is second. The mean and standard
48 error of each lake and treatment is given on the left.

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Table S1: Mean and Standard Error of traits in wild caught stickleback.
First dorsal spine (DS1), second dorsal spine (DS2), pelvic spine (PS), pelvic girdle (PG), and lateral plates (LP)
All spine traits are size corrected.

			Morphology								Behaviour	mean tank
Lake	**Type**	**Year**	**N**	**DS 1 (mm)**	**DS 2 (mm)**	**PS (mm)**	**PG (mm)**	**LP**	**Armor PC1**	**Gape Width**	**N**	**position**
Blackburn	No Sculpin	2011	20	2.2 ± 0.1	3.0 ± 0.1	3.4 ± 0.1	6.3 ± 0.2	3.7 ± 0.2	-1.84 ± 0.14	2.7 ± 0.2	10	0.87 ± 0.38
Bullocks	No Sculpin	2011	26	0.8 ± 0.2	2.6 ± 0.1	2.8 ± 0.1	5.7 ± 0.1	3.3 ± 0.2	-3.23 ± 0.17	3.9 ± 0.2	0	
Cranby	No Sculpin	2011	19	2.3 ± 0.1	3.1 ± 0.1	4.4 ± 0.1	1.0 ±	5.4 ± 0.2	-0.97 ± 0.1	4.4 ± 0.2	12	1.72 ± 0.43
Hoggan	No Sculpin	2011	16	2.3 ± 0.1	3.0 ± 0.1	3.4 ± 0.1	6.3 ± 0.2	4.7 ± 0.15	-1.58 ± 0.1	4.1 ± 0.3	11	0.51 ± 0.37
Kirk	No Sculpin	2011	10	2.8 ± 0.1	3.3 ± 0.1	3.7 ± 0.1	7.1 ± 0.2	3.1 ± 0.5	-1.24 ± 0.13	3.0 ± 0.5	15	1.43 ± 0.11
Klein	No Sculpin	2011	20	2.4 ± 0.2	3.2 ± 0.1	4.0 ± 0.1	7.3 ± 0.1	5.8 ± 0.2	-0.85 ± 0.13	3.9 ± 0.4	25	2.95 ± 0.33
Stowell	No Sculpin	2011	22	1.9 ± 0.1	2.6 ± 0.1	2.8 ± 0.1	6.7 ± 0.2	4.9 ± 0.2	-2.06 ± 0.1	4.1 ± 0.2	19	0.88 ± 0.25
Trout	No Sculpin	2011	19	3.0 ± 0.1	3.8 ± 0.1	4.4 ± 0.1	7.7 ± 0.1	4.4 ± 0.2	-0.28 ± 0.08	3.8 ± 0.2	22	2.37 ± 0.21
Ambrose	Sculpin	2011	19	3.3 ± 0.1	4.0 ± 0.1	5.1 ± 0.1	8.4 ± 0.1	6.1 ± 0.1	0.40 ± 0.07	2.7 ± 0.3	24	2.11 ± 0.30
Brown	Sculpin	2011	7	3.2 ± 0.2	3.9 ± 0.05	4.7 ± 0.1	8.1 ± 0.1	6.4 ± 0.2	0.19 ± 0.09	3.6 ± 0.4	0	
Cedar	Sculpin	2011	17	3.3 ± 0.2	4.2 ± 0.1	5.8 ± 0.1	8.7 ± 0.1	6.8 ± 0.3	0.77 ± 0.1	3.6 ± 0.6	0	
North	Sculpin	2011	7	3.3 ± 0.4	4.2 ± 0.2	5.5 ± 0.2	8.9 ± 0.4	33.9 ± 0.3	1.69 ± 0.18	3.2 ± 0.4	11	2.68 ± 0.49
Ormond	Sculpin	2012	25	4.8 ± 0.1	5.4 ± 0.1	7.1 ± 0.1	9.7 ± 0.1	6.6 ± 0.2	2.08 ± 0.07	3.9 ± 0.2	0	
Pachena	Sculpin	2012	11	3.0 ± 0.1	3.9 ± 0.1	5.3 ± 0.1	9.4 ± 0.2	6.5 ± 0.2	0.63 ± 0.11	3.0 ± 0.5	0	
Paq	Sculpin	2011	20	3.3 ± 0.1	4.1 ± 0.1	5.6 ± 0.1	9.1 ± 0.2	6.3 ± 0.2	0.79 ± 0.08	3.3 ± 0.2	15	1.87 ± 0.42
Rosseau	Sculpin	2012	19	5.4 ± 0.2	6.0 ± 0.2	8.3 ± 0.2	11.1 ± 0.1	6.9 ± 0.2	2.92 ± 0.08	2.9 ± 0.3	0	
L Camp	Marine	2012	11	4.8 ± 0.2	4.8 ± 0.1	8.0 ± 0.1	11.0 ± 0.1	33.6 ± 0.2	3.26 ± 0.08	3.1 ± 0.3	0	
Oyster	Marine	2011	19	3.9 ± 0.1	4.9 ± 0.1	6.5 ± 0.1	10.1 ± 0.1	27.1 ± 0.5	2.50 ± 0.08	4.0 ± 0.3	14	0.77 ± 0.21

Table S2: Principal component loadings for armor traits.

Wild-Caught Stickleback

Trait	PC1	PC2	PC3	PC4	PC5
DS1	0.4342	0.3085	-0.8432	-0.0731	-0.0062
DS2	0.4702	0.2709	0.2974	0.5534	-0.5575
PS	0.4860	0.1598	0.2896	0.1534	0.7943
PG	0.4706	-0.0256	0.3034	-0.7925	-0.2403
lateral plates	0.3644	-0.8973	-0.1572	0.1919	-0.0221

Experimental Stickleback

Trait	PC1	PC2	PC3	PC4	PC5
DS1	0.4483	0.2983	-0.5389	-0.6259	0.1669
DS2	0.4446	0.4918	-0.0651	0.6865	0.2914
PS	0.4830	0.0677	0.1522	0.0180	-0.8595
PG	0.4514	-0.1303	0.7490	-0.2851	0.3701
lateral plates	0.4054	-0.8048	-0.3480	0.2352	0.1077

Table S3: Sample sizes for behavioral assays.

Lake	Type	Family	Treatment	Water Column assay (N)	Shoaling Assay (N)
Ambrose	Sympatric	Amb1	sculpin	10	9
Ambrose	Sympatric	Amb2	sculpin	5	5
Ambrose	Sympatric	Amb4	sculpin	7	7
Ambrose	Sympatric	Amb1	stickleback	10	8
Ambrose	Sympatric	Amb2	stickleback	9	9
Ambrose	Sympatric	Amb4	stickleback	4	4
Cranby	Allopatric	Cran1	sculpin	10	10
Cranby	Allopatric	Cran2	sculpin	10	10
Cranby	Allopatric	Cran3	sculpin	10	10
Cranby	Allopatric	Cran4	sculpin	10	10
Cranby	Allopatric	Cran1	stickleback	10	10
Cranby	Allopatric	Cran2	stickleback	9	10
Cranby	Allopatric	Cran3	stickleback	10	9
Cranby	Allopatric	Cran4	stickleback	10	10
Kirk	Allopatric	Kirk1	sculpin	10	9
Kirk	Allopatric	Kirk2	sculpin	10	10
Kirk	Allopatric	Kirk3	sculpin	10	10
Kirk	Allopatric	Kirk4	sculpin	10	10
Kirk	Allopatric	Kirk1	stickleback	9	10
Kirk	Allopatric	Kirk2	stickleback	10	10
Kirk	Allopatric	Kirk3	stickleback	10	10
Kirk	Allopatric	Kirk4	stickleback	10	10
Little Campb	Marine	LC1	sculpin	10	0
Little Campb	Marine	LC2	sculpin	10	9
Little Campb	Marine	LC3	sculpin	10	10
Little Campb	Marine	LC4	sculpin	10	10
Little Campb	Marine	LC1	stickleback	9	0
Little Campb	Marine	LC2	stickleback	10	9
Little Campb	Marine	LC3	stickleback	10	8
Little Campb	Marine	LC4	stickleback	10	7
Oyster Bay	Marine	O1	sculpin	10	8
Oyster Bay	Marine	O2	sculpin	10	10
Oyster Bay	Marine	O3	sculpin	10	9
Oyster Bay	Marine	O4	sculpin	10	10
Oyster Bay	Marine	O1	stickleback	9	9
Oyster Bay	Marine	O2	stickleback	10	10
Oyster Bay	Marine	O3	stickleback	10	9
Oyster Bay	Marine	O4	stickleback	10	0
Paq	Sympatric	Paq1	sculpin	10	10
Paq	Sympatric	Paq2	sculpin	8	9
Paq	Sympatric	Paq3	sculpin	10	9

Paq	Sympatric	Paq4	sculpin	10	9
Paq	Sympatric	Paq1	stickleback	10	7
Paq	Sympatric	Paq2	stickleback	9	7
Paq	Sympatric	Paq3	stickleback	10	8
Paq	Sympatric	Paq4	stickleback	10	9
Rosseau	Sympatric	R3	sculpin	1	0
Rosseau	Sympatric	R3	stickleback	8	6
Rosseau	Sympatric	R4	stickleback	10	10
Trout	Allopatric	T1	sculpin	10	10
Trout	Allopatric	T2	sculpin	7	10
Trout	Allopatric	T3	sculpin	9	10
Trout	Allopatric	T1	stickleback	10	10
Trout	Allopatric	T2	stickleback	10	10
Trout	Allopatric	T3	stickleback	10	10

Table S4: Mean and Standard Error of traits in experimental stickleback from the 'control' treatment.
First dorsal spine (DS1), second dorsal spine (DS2), pelvic spine (PS), pelvic girdle (PG), and lateral plates (LP)
All spine traits are size corrected. Sample size is number of families measured.

Lake	Type	N	DS 1 (mm)	DS 2 (mm)	PS (mm)	PG (mm)	LP	Gape Width	Armor PC1
Cranby	No Sculpin	4	3.4 ± 0.1	4.1 ± 0.1	5.0 ± 0.1	8.6 ± 0.1	5.9 ± 0.3	3.0 ± 0.1	14.1 ± 0.5
Kirk	No Sculpin	4	4.0 ± 0.02	4.6 ± 0.1	5.0 ± 0.1	7.9 ± 0.2	4.4 ± 0.3	3.4 ± 0.1	15.3 ± 0.1
Trout	No Sculpin	4	4.5 ± 0.03	5.0 ± 0.1	6.2 ± 0.2	8.6 ± 0.1	4.9 ± 0.1	3.0 ± 0.1	19.3 ± 0.5
Ambrose	Sculpin	3	4.5 ± 0.3	5.4 ± 0.3	6.3 ± 0.1	9.0 ± 0.1	6.7 ± 0.1	3.2 ± 0.04	19.6 ± 0.8
Paq	Sculpin	4	4.07 ± 0.1	5.3 ± 0.1	7.3 ± 0.1	10.7 ± 0.1	7.1 ± 0.2	3.0 ± 0.1	21.9 ± 0.3
Rosseau	Sculpin	2	6.1 ± 0.1	6.4 ± 0.1	8.8 ± 0.2	11.7 ± 0.2	7.9 ± 0.3	3.1 ± 0.1	27.8 ± 0.7
L Camp	Marine	4	5.8 ± 0.1	6.0 ± 0.1	8.9 ± 0.2	11.7 ± 0.1	33.6 ± 0.2	3.0 ± 0.1	27.4 ± 0.04
Oyster	Marine	4	5.6 ± 0.1	5.8 ± 0.1	8.5 ± 0.2	10.7 ± 0.1	31.8 ± 1.6	3.0 ± 0.03	26.2 ± 0.4
Paq Male	F1	4	4.7 ± 0.1	5.2 ± 0.1	7.0 ± 0.04	9.8 ± 0.1	6.2 ± 0.1	3.1 ± 0.1	21.3 ± 0.4
Trout Male	F1	2	4.5 ± 0.1	5.1 ± 0.1	6.7 ± 0.2	9.6 ± 0.02	6.4 ± 0.02	3.0 ± 0.02	20.4 ± 0.2