

## Surface environment modification in Atlantic salmon sea-cages: effects on amoebic gill disease, salmon lice, growth and welfare

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Table S1. Mean salinity, temperature and dissolved oxygen saturation recorded during weekly depth profiles at the reference location (reflecting standard cage conditions), and within SW and FW snorkel cages in the periods preceding sampling times 1–4, represented as periods 1–4.

Variable	Period	Depth (m)	Standard	SW snorkel cage	FW snorkel cage
<b>Mean salinity</b>	1	0–1	29.0	31.0	0.2
		1–2	30.8	30.9	0.2
		2–3	30.9	30.9	2.8
		3–4	30.9	30.9	23.8
		4–15	31.2	31.2	31.1
	2	0–1	31.0	31.6	0.5
		1–2	31.7	31.7	0.5
		2–3	31.9	31.8	10.4
		3–4	31.9	31.8	25.8
		4–15	32.1	32.0	31.9
	3	0–1	28.3	30.4	0.4
		1–2	30.1	30.4	0.4
		2–3	30.2	30.4	8.3
		3–4	30.3	30.4	26.5
		4–15	31.4	31.6	31.6
	4	0–1	30.8	31.6	0.1
		1–2	31.3	31.6	0.1
		2–3	31.4	31.6	6.2
		3–4	31.4	31.7	23.5
		4–15	32.3	32.3	32.2
<b>Mean temperature (°C)</b>	1	0–1	11.1	12.2	9.6
		1–2	12.0	12.1	9.9
		2–3	12.1	12.1	10.1
		3–4	12.1	12.1	11.6
		4–15	12.4	12.4	12.3
	2	0–1	10.0	10.2	8.8
		1–2	10.0	10.2	8.9
		2–3	10.1	10.1	9.2
		3–4	10.1	10.1	9.9
		4–15	10.2	10.2	10.3
	3	0–1	7.4	8.1	7.4
		1–2	7.9	8.1	7.4
		2–3	8.0	8.1	7.6
		3–4	8.0	8.1	8.0
		4–15	9.0	9.2	9.2

Variable	Period	Depth (m)	Standard	SW snorkel cage	FW snorkel cage
	4	0-1	7.6	8.3	6.9
		1-2	7.9	8.3	7.0
		2-3	7.9	8.4	7.2
		3-4	8.1	8.4	8.0
		4-15	9.1	9.2	9.2
<b>Mean DO saturation (%)</b>	1	0-1	81.0	79.8	128.2
		1-2	79.8	79.3	139.4
		2-3	80.0	79.2	137.7
		3-4	80.1	79.1	118.2
		4-15	79.0	79.4	82.6
	2	0-1	84.3	82.2	102.8
		1-2	83.4	82.5	109.7
		2-3	82.8	82.7	101.6
		3-4	82.6	82.7	92.0
		4-15	82.7	82.9	84.4
	3	0-1	83.5	81.2	121.3
		1-2	81.9	80.6	123.5
		2-3	81.2	80.2	120.4
		3-4	81.3	80.0	106.0
		4-15	80.6	78.3	83.4
	4	0-1	79.6	84.1	143.5
		1-2	79.7	83.7	147.6
		2-3	79.2	83.5	134.2
		3-4	78.1	83.5	109.9
		4-15	79.0	82.6	83.0

Table S2. Generalised linear model outputs from analysis of light plus AGD-related gill scores ( $\geq 2$ ) between cage types at each time, with treatment \* cage, treatment + cage, and treatment only included as factors in model sets. Mean AGD-related gill scores for each cage type and time are also provided (0 for no gill pathology and 1–5 for increasing severity of gill pathology). A simpler model was selected if no significant differences were detected between models based on ANOVA comparisons.

Time	Treatments compared	Light plus AGD levels (%)	Mean AGD gill score (0–5)	Effect on light plus AGD levels	z	p
1	Standard vs SW snorkel	15.0 vs 5.0	1.0 vs 0.9	Treatment	-1.7	0.1
	Standard vs FW snorkel	15.0 vs 7.5	1.0 vs 0.7	Treatment	-1.1	0.3
	SW vs FW snorkel	5.0 vs 7.5	0.9 vs 0.7	Treatment	-0.5	0.6
2	Standard vs SW snorkel	45.0 vs 28.3	1.4 vs 1.2	Treatment	3.1	0.002
				Cage	2.9	0.004
				Treatment * cage	-4.1	<0.001
	Standard vs FW snorkel	45.0 vs 27.5	1.4 vs 1.2	Treatment	-2.2	0.03
	SW vs FW snorkel	28.3 vs 27.5	1.2 vs 1.2	Cage	2.6	0.01
				Treatment	1.5	0.1
Treatment * cage				-2.3	0.02	
3	Standard vs SW snorkel	43.3 vs 38.3	1.4 vs 1.3	Treatment	3.3	<0.001
				Cage	3.1	0.002
				Treatment * cage	-3.8	<0.001
	Standard vs FW snorkel	43.3 vs 17.5	1.4 vs 1.1	Treatment	-3.4	<0.001
	SW vs FW snorkel	38.3 vs 17.5	1.3 vs 1.1	Cage	3.9	<0.001
				Treatment	0.01	1.0
Treatment * cage				-0.01	1.0	
4	Standard vs SW snorkel	52.5 vs 33.3	1.5 vs 1.1	Treatment	1.7	0.1
				Cage	2.2	0.03
				Treatment * cage	-2.5	0.01
	Standard vs FW snorkel	52.5 vs 32.5	1.5 vs 1.3	Treatment	-2.4	0.02
	SW vs FW snorkel	33.3 vs 32.5	1.1 vs 1.3	Cage	2.8	0.003
				Treatment	1.9	0.06
Treatment * cage				-2.1	0.04	