Supplementary material

Table S1. Information on the season, month, and location within the farm for each sample, and the number of raw and filtered paired-end sequences per sample.

No.	Sample ID	Month	Season	Location	Raw sequences	Filtered sequences
1	L1B	June	Summer	Beginning	72,524	42,875
2	L1E	June	Summer	End	82,424	52,010
3	S1B	June	Summer	Beginning	79,758	51,031
4	S1E	June	Summer	End	53,754	35,519
5	B1B	June	Summer	Beginning	58,710	38,387
6	B1E	June	Summer	End	72,734	45,671
7	C1	June	Summer	Control	64,369	36,729
8	L2B	June	Summer	Beginning	81,608	47,011
9	L2E	June	Summer	End	35,289	20,723
10	S2B	June	Summer	Beginning	45,429	26,979
11	S2E	June	Summer	End	39,722	26,029
12	B2B	June	Summer	Beginning	28,020	14,512
13	C2	June	Summer	Control	87,426	55,538
14	L3B	July	Summer	Beginning	88,604	52,700
15	L3E	July	Summer	End	79,956	46,284
16	S3B	July	Summer	Beginning	37,915	24,777
17	S3E	July	Summer	End	38,102	25,591
18	B3B	July	Summer	Beginning	41,065	28,004
19	B3E	July	Summer	End	37,379	24,778
20	C3	July	Summer	Control	55,009	36,898
21	L4B	August	Summer	Beginning	51,036	34,040
22	L4E	August	Summer	End	38,582	25,967
23	S4B	August	Summer	Beginning	38,085	25,965
24	S4E	August	Summer	End	69,705	43,954
25	B4B	August	Summer	Beginning	32,180	20,477
26	B4E	August	Summer	End	59,416	38,105
27	C4	August	Summer	Control	33,321	21,986
28	L5E	August	Summer	End	42,501	26,009
29	S5E	August	Summer	End	41,026	27,366
30	B5B	August	Summer	Beginning	45,631	30,561
31	C5	August	Summer	Control	89,780	61,267
32	L6B	September	Autumn	Beginning	51,902	33,382
33	L6E	September	Autumn	End	46,548	28,474
34	S6B	September	Autumn	Beginning	50,686	33,127
35	S6E	September	Autumn	End	55,084	35,472
36	B6B	September	Autumn	Beginning	55,323	33,824
37	B6E	September	Autumn	End	59,734	38,429
38	C6	September	Autumn	Control	48,143	34,351

39	L7B	October	Autumn	Beginning	51,242	32,270
40	L7E	October	Autumn	End	48,067	29,981
41	S7B	October	Autumn	Beginning	155,868	97,115
42	S7E	October	Autumn	End	96,577	58,335
43	B7B	October	Autumn	Beginning	93,410	55,425
44	B7E	October	Autumn	End	92,634	53,309
45	C7	October	Autumn	Control	87,399	57,364
46	L8B	November	Autumn	Beginning	45,308	27,077
47	L8E	November	Autumn	End	69,103	36,053
48	S8B	November	Autumn	Beginning	119,676	67,434
49	S8E	November	Autumn	End	37,491	21,841
50	B8B	November	Autumn	Beginning	46,415	27,021
51	B8E	November	Autumn	End	37,298	21,199
52	C8	November	Autumn	Control	39,666	25,738
53	L9B	December	Winter	Beginning	40,824	23,682
54	L9E	December	Winter	End	31,035	18,505
55	S9B	December	Winter	Beginning	45,492	27,146
56	S9E	December	Winter	End	31,171	19,006
57	B9B	December	Winter	Beginning	36,076	20,680
58	B9E	December	Winter	End	41,039	24,731
59	L10B	January	Winter	Beginning	30,912	17,480
60	L10E	January	Winter	End	42,531	23,065
61	S10B	January	Winter	Beginning	45,553	27,014
62	S10E	January	Winter	End	42,190	24,395
63	B10B	January	Winter	Beginning	42,511	26,495
64	B10E	January	Winter	End	45,638	27,423
65	C10	January	Winter	Control	37,724	23,400
66	L11B	February	Winter	Beginning	35,343	21,315
67	L11E	February	Winter	End	40,378	24,171
68	S11B	February	Winter	Beginning	34,770	21,045
69	S11E	February	Winter	End	32,813	19,518
70	B11B	February	Winter	Beginning	32,553	18,913
71	B11E	February	Winter	End	29,296	17,140
72	C11	February	Winter	Control	30,960	19,131
73	L12B	March	Spring	Beginning	60,968	31,393
74	L12E	March	Spring	End	74,145	38,714
75	S12B	March	Spring	Beginning	60,723	36,051
76	S12E	March	Spring	End	52,151	28,120
77	B12B	March	Spring	Beginning	66,272	35,144
78	B12E	March	Spring	End	65,686	33,548
79	C12	March	Spring	Control	54,790	30,554
80	L13B	April	Spring	Beginning	53,014	28,831
81	L13E	April	Spring	End	75,880	37,206
82	S13B	April	Spring	Beginning	70,116	39,154

83	S13E	April	Spring	End	67,251	36,402
84	B13B	April	Spring	Beginning	81,974	44,207
85	B13E	April	Spring	End	76,558	41,670
86	C13	April	Spring	Control	68,541	39,509
87	L14B	April	Spring	Beginning	239,674	133,544
88	L14E	April	Spring	End	103,616	55,990
89	S14B	April	Spring	Beginning	64,881	38,260
90	S14E	April	Spring	End	93,387	48,393
91	B14B	April	Spring	Beginning	62,655	32,921
92	B14E	April	Spring	End	100,684	53,926
93	C14	April	Spring	Control	85,005	48,132
94	L15B	May	Spring	Beginning	59,638	31,193
95	L15E	May	Spring	End	58,863	32,561
96	S15B	May	Spring	Beginning	60,347	33,278
97	S15E	May	Spring	End	35,924	19,827
98	B15B	May	Spring	Beginning	48,134	28,547
99	B15E	May	Spring	End	66,008	39,587
100	C15	May	Spring	Control	58,672	35,635
-	Average	-	-	-	59,230	35,115

Table S2. Alpha diversity indices per sample.

No.	Sample ID	Observed	Shannon	Simpson	Inverse Simpson
1	L1B	290	4.427	0.975	39.782
2	L1E	314	4.222	0.961	25.959
3	S1B	352	4.428	0.966	29.254
4	S1E	240	4.132	0.963	26.917
5	B1B	315	4.598	0.979	47.289
6	B1E	327	4.619	0.979	46.983
7	C1	449	5.235	0.989	93.064
8	L2B	388	4.859	0.984	61.168
9	L2E	297	4.692	0.982	54.528
10	S2B	301	4.767	0.985	64.591
11	S2E	252	4.354	0.974	39.160
12	B2B	237	4.701	0.984	64.243
13	C2	566	5.335	0.990	101.743
14	L3B	360	4.389	0.970	32.934
15	L3E	357	4.385	0.967	30.040
16	S3B	278	4.568	0.979	47.782
17	S3E	242	4.305	0.970	33.486
18	B3B	313	4.881	0.988	81.428
19	B3E	262	4.640	0.983	57.439
20	C3	472	5.320	0.991	110.905

21	L4B	275	4.064	0.951	20.495
22	L4E	229	3.938	0.950	20.156
23	S4B	266	4.283	0.965	28.738
24	S4E	243	4.016	0.957	23.362
25	B4B	251	4.506	0.976	40.998
26	B4E	277	4.270	0.966	29.320
27	C4	264	4.702	0.983	59.418
28	L5E	272	4.310	0.967	30.382
29	S5E	220	3.997	0.957	23.050
30	B5B	276	4.280	0.962	26.161
31	C5	459	4.993	0.984	63.053
32	L6B	263	3.956	0.942	17.251
33	L6E	290	4.261	0.960	25.032
34	S6B	280	4.155	0.959	24.232
35	S6E	249	3.944	0.949	19.721
36	B6B	321	4.474	0.968	31.649
37	B6E	257	4.073	0.956	22.577
38	C6	320	4.673	0.974	39.158
39	L7B	290	4.223	0.965	28.214
40	L7E	249	3.952	0.956	22.786
41	S7B	422	4.258	0.962	26.357
42	S7E	341	4.046	0.955	22.121
43	B7B	347	4.095	0.958	23.894
44	B7E	355	4.178	0.961	25.561
45	C7	448	4.892	0.974	39.105
46	L8B	279	4.096	0.956	22.577
47	L8E	316	4.167	0.960	24.815
48	S8B	461	4.490	0.966	29.454
49	S8E	227	3.927	0.952	20.780
50	B8B	283	4.256	0.964	27.955
51	B8E	239	4.064	0.958	23.720
52	C8	352	4.882	0.978	44.653
53	L9B	313	4.456	0.962	26.576
54	L9E	268	4.061	0.935	15.499
55	S9B	292	4.036	0.944	17.778
56	S9E	225	3.768	0.930	14.250
57	B9B	314	4.845	0.982	57.023
58	B9E	281	4.080	0.938	16.005
59	L10B	341	5.068	0.988	84.216
60	L10E	380	4.992	0.984	63.576
61	S10B	429	5.134	0.987	76.300
62	S10E	337	4.358	0.951	20.407
63	B10B	410	5.184	0.989	92.312
64	B10E	416	4.964	0.981	53.047

65	C9	397	5.240	0.990	97.303
66	L11B	401	5.247	0.990	103.753
67	L11E	430	5.278	0.990	99.571
68	S11B	390	5.212	0.989	91.269
69	S11E	363	5.027	0.985	67.930
70	B11B	373	5.230	0.990	97.412
71	B11E	352	4.993	0.983	58.308
72	C10	372	5.219	0.989	91.526
73	L12B	461	5.201	0.988	82.110
74	L12E	499	5.270	0.989	89.052
75	S12B	378	4.158	0.949	19.569
76	S12E	375	4.724	0.972	36.246
77	B12B	474	5.248	0.989	88.691
78	B12E	444	5.018	0.983	58.352
79	C12	445	5.206	0.986	72.889
80	L13B	321	4.571	0.976	41.390
81	L13E	472	4.935	0.983	57.321
82	S13B	373	4.594	0.968	31.378
83	S13E	323	4.214	0.957	23.016
84	B13B	429	4.791	0.980	49.297
85	B13E	374	4.617	0.975	39.502
86	C13	404	4.872	0.979	47.815
87	L14B	498	4.854	0.982	55.581
88	L14E	328	4.527	0.976	42.474
89	S14B	275	4.396	0.973	36.412
90	S14E	285	4.253	0.966	29.290
91	B14B	273	4.390	0.974	38.970
92	B14E	360	4.584	0.978	45.775
93	C14	387	4.879	0.982	56.824
94	L15B	371	4.653	0.974	38.805
95	L15E	283	4.437	0.973	36.686
96	S15B	337	4.349	0.969	31.752
97	S15E	181	4.108	0.965	28.542
98	B15B	281	4.466	0.976	40.913
99	B15E	283	4.472	0.976	41.372
100	C15	385	5.024	0.986	72.232

Table S3. PERMANOVA results of the pairwise comparisons between each season using the Bray-Curtis dissimilarity matrix and the weighted UniFrac metric on the bacterial ASVs for all seawater samples. Significant codes: '***': 0; '**': 0.001; '*': 0.01; '.': 0.05; ' ': 0.1.

	Bray-Curtis			Weighted UniFrac		
	F	**R^2**	**p-value**	**F**	**R^2**	**p-value**
Winter vs Summer	30.22	0.38	0.001 ***	34.08	0.41	0.001 ***
Winter vs Autumn	25.85	0.40	0.001 ***	27.42	0.41	0.001 ***
Winter vs Spring	15.56	0.25	0.001 ***	13.93	0.23	0.001 ***
Summer vs Autumn	14.03	0.22	0.001 ***	8.70	0.15	0.001 ***
Summer vs Spring	13.85	0.20	0.001 ***	14.71	0.21	0.001 ***
Autumn vs Spring	22.99	0.33	0.001 ***	21.29	0.31	0.001 ***

Table S4. Number of enriched ASVs (En) in pairwise comparisons between the four seasons in aquaculture farms ($log_2(fc) \geq 2$, p-adjust < 0.01). Columns show the season to which the number of enriched ASVs corresponds, while rows show the season compared to which the ASVs were found enriched.

	En ASVs in Summer	**En ASVs in Autumn**	**En ASVs in Winter**	**En ASVs in Spring**
Summer	-	14	112	7
Autumn	59	-	95	118
Winter	48	33	-	15
Spring	40	31	54	-

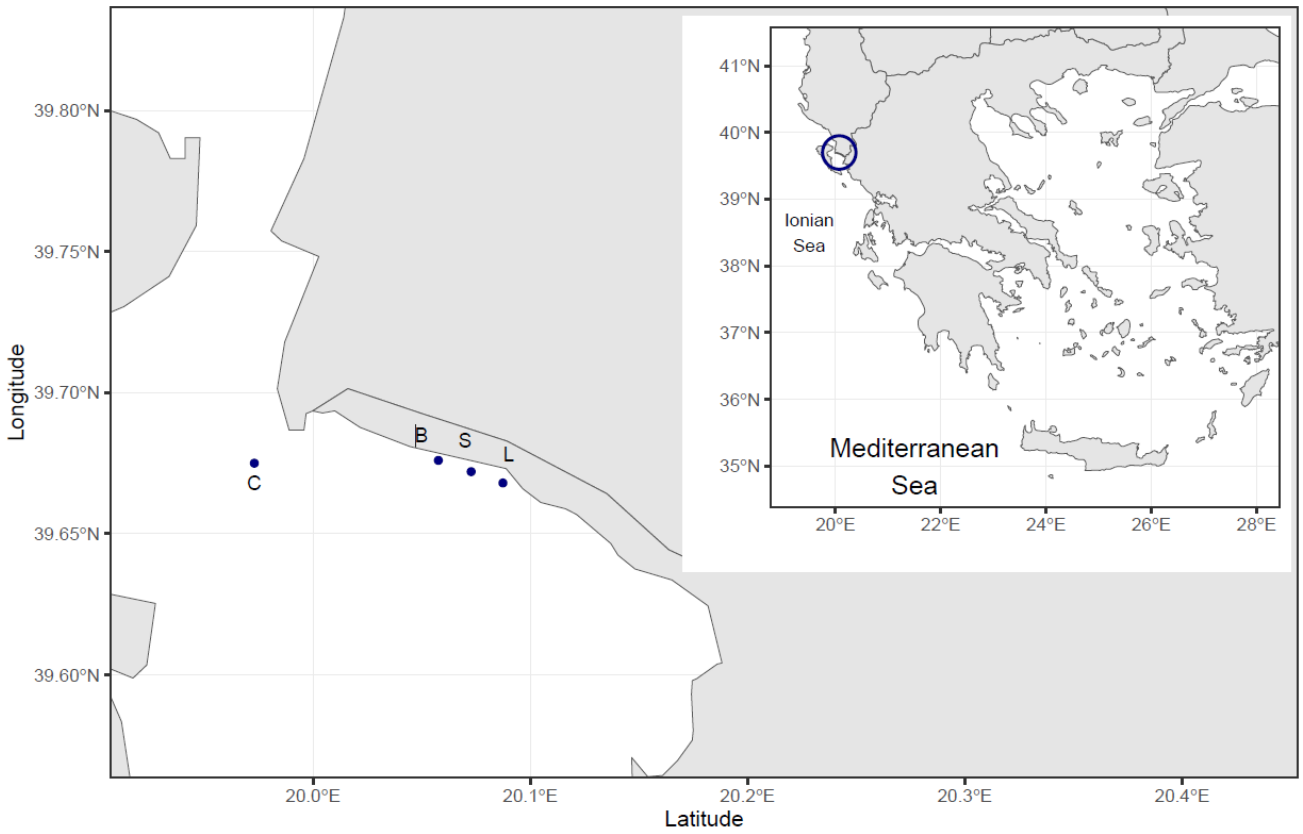

Figure S1. Map of the study sites. The blue circle on the upper-right-corner map denotes the wider region of Greece in which the area under investigation is located. The three aquaculture farms' units and the control location are indicated by blue dots; B: Bastia aquaculture farm, S: Skaloma aquaculture farm, L: Lorida aquaculture farm, C: Control site.

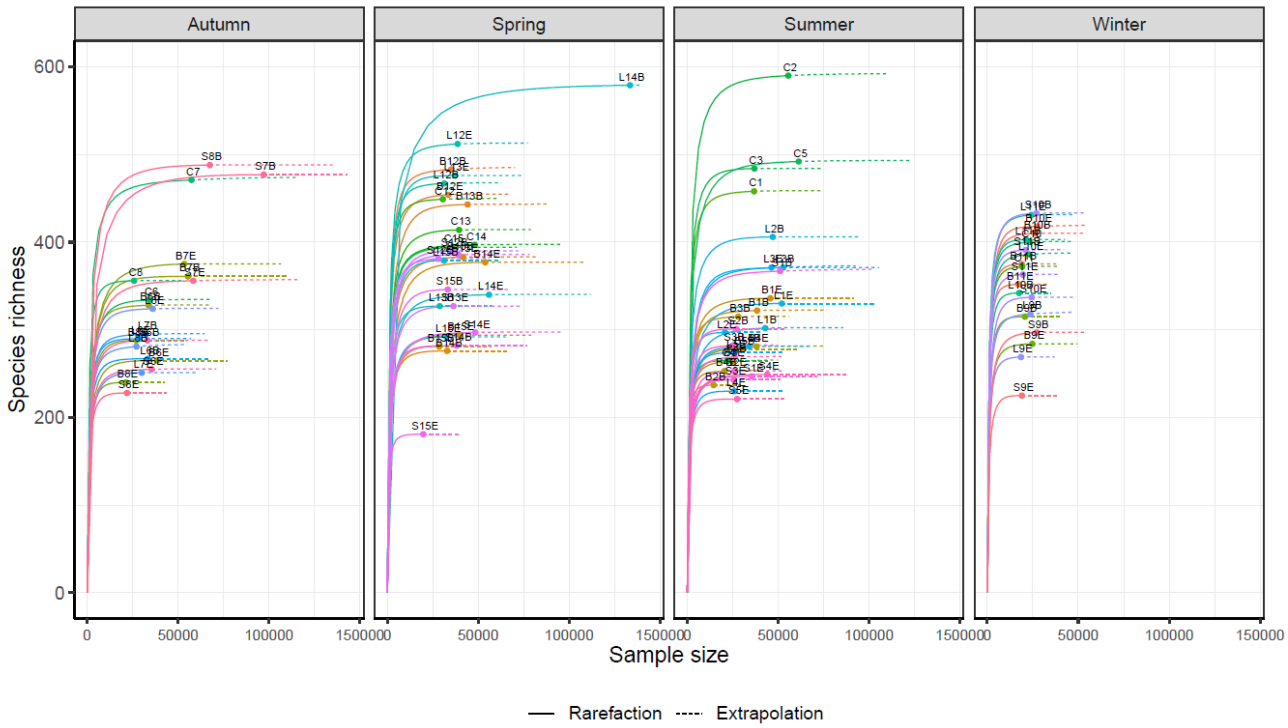

Figure S2. Alpha rarefaction curves of 16S rRNA amplicon sequences of bacterial communities in the whole dataset for each season; summer 31 samples, autumn 21 samples, winter 20 samples, spring 28 samples. The solid lines depict the observed accumulation with the number of reads sampled, whereas the dashed lines depict the extrapolated accumulation up to the double amount of reads.

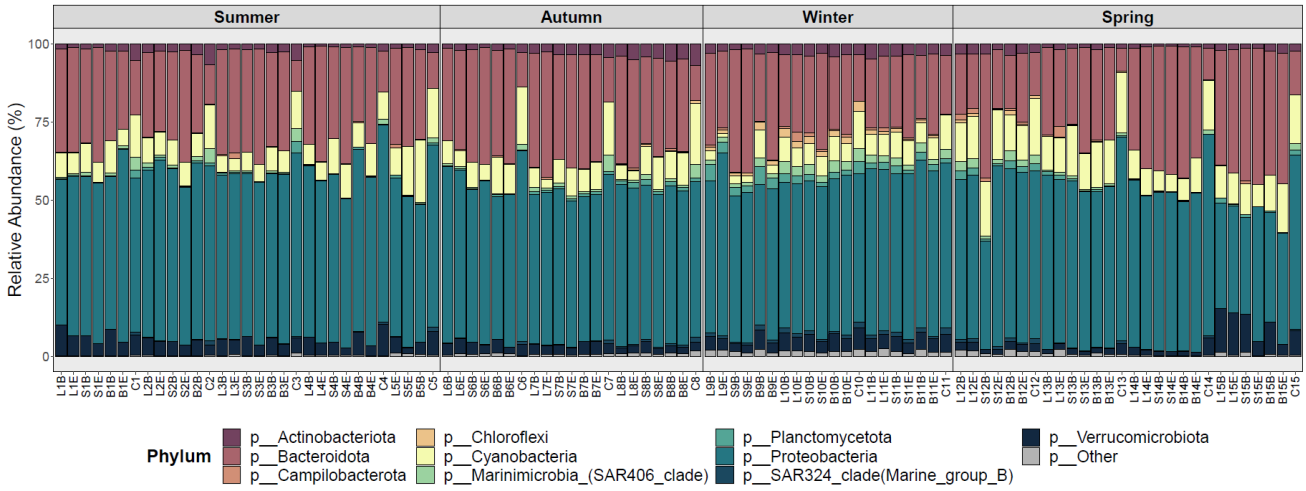

Figure S3. Barplot of relative abundance per sample at the phylum taxonomic level. The 10 most abundant phyla in the seawater samples from the aquaculture farms and the control site are presented. The remaining phyla are included under the "Other" category.

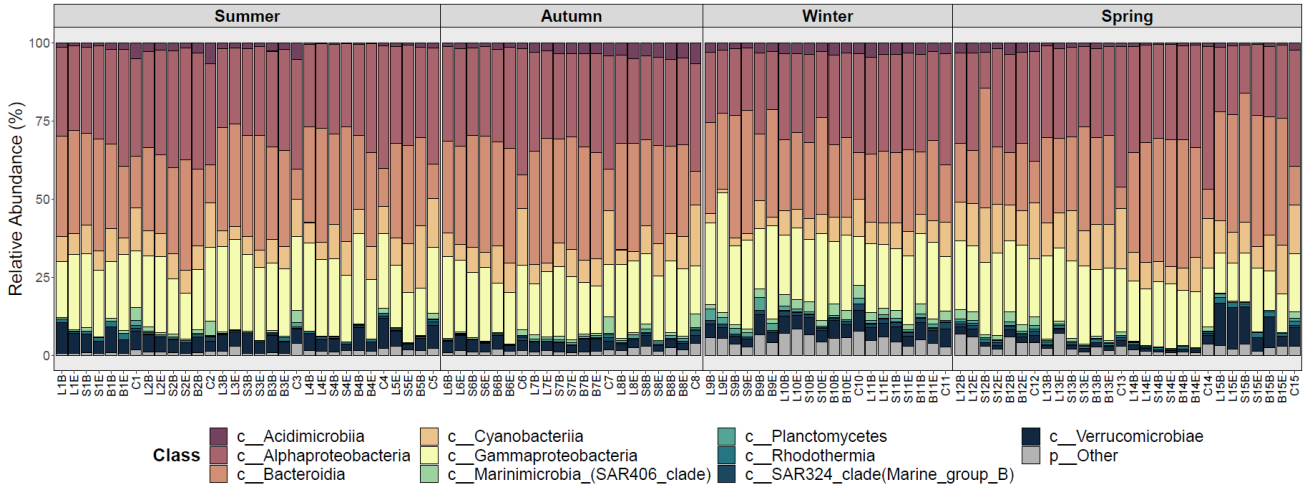

Figure S4. Barplot of relative abundance per sample at the class taxonomic level. The 10 most abundant classes in the seawater samples from the aquaculture farms and the control site are presented. The remaining classes are included under the "Other" category.

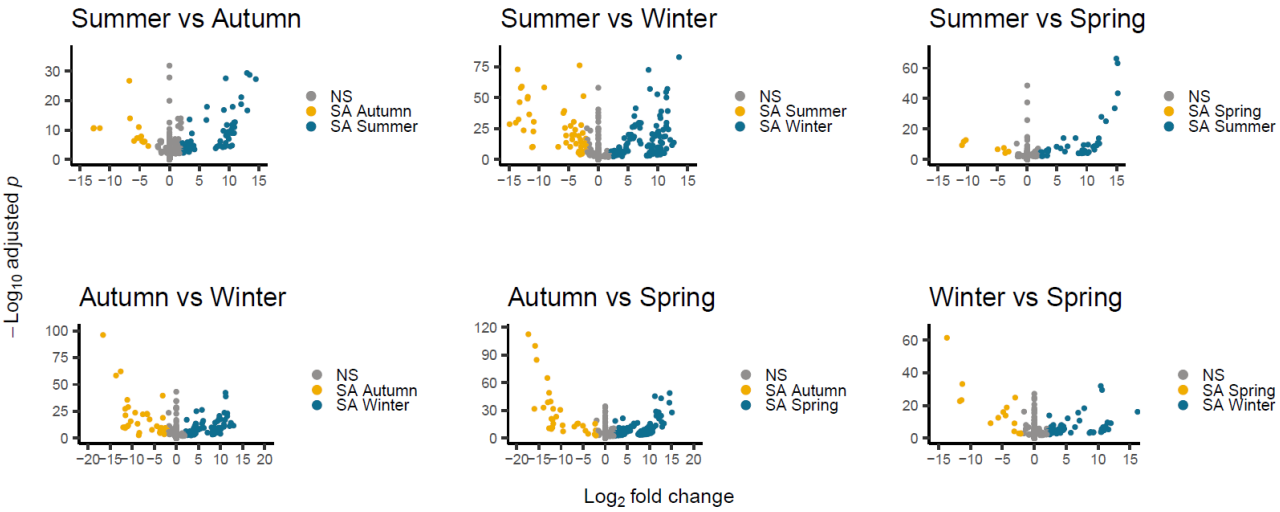

Figure S5. Volcano plots of the differentially abundant ASVs identified in the pairwise comparisons between seasons in the three aquaculture farms (Lorida, Bastia, Skaloma). Yellow and blue dots indicate differentially abundant ASVs (SA at absolute $\log_2$(fold–change)≥ 2 and Benjamini-Hochberg adjusted p-value < 0.01 cutoffs), and not significant ASVs are presented with grey (NS).