Table S1. Mean ± SE of the percentage of total fatty acids analysed in the liver of Norwegian coastal cod (NCC) and Northeast Arctic cod (NEAC), by sex (females and males) and treatment (control and impact).

	NCC				NEAC			
	Female		Male		Female		Male	
	Control	Impact	Control	Impact	Control	Impact	Control	Impact
Lauric	0.02 ± 0.03	0.02 ± 0.04	0.01 ± 0.03	0.02 ± 0.02	0.03 ± 0.03	0.02 ± 0.03	0.04 ± 0.04	0.01 ± 0.01
Tridecanoic	4.80 ± 1.87	6.53 ± 8.36	6.75 ± 5.09	12.67 ± 8.02	4.98 ± 0.91	4.85 ± 2.20	4.39 ± 0.88	3.96 ± 0.76
Myristic	6.38 ± 2.36	4.09 ± 2.16	5.90 ± 1.83	6.07 ± 3.28	6.54 ± 1.16	4.08 ± 1.91	5.90 ± 1.52	4.03 ± 1.16
Myristoleic	0.07 ± 0.02	0.04 ± 0.03	0.06 ± 0.03	0.06 ± 0.03	0.08 ± 0.04	0.07 ± 0.08	0.10 ± 0.02	0.05 ± 0.02
Pentadecanoic	0.54 ± 0.16	0.45 ± 0.22	0.59 ± 0.13	0.63 ± 0.23	0.56 ± 0.09	0.50 ± 0.23	0.46 ± 0.12	0.41 ± 0.09
Palmitic	15.63 ± 3.41	13.80 ± 5.08	16.66 ± 3.17	17.47 ± 3.95	15.32 ± 2.08	14.29 ± 5.70	14.83 ± 3.89	13.62 ± 3.16
Palmitoleic	4.69 ± 3.44	4.10 ± 2.89	4.62 ± 3.86	7.00 ± 2.83	9.51 ± 3.50	4.27 ± 4.01	10.33 ± 2.20	5.79 ± 1.35
Heptadecanoic	0.27 ± 0.12	0.25 ± 0.14	0.34 ± 0.18	0.41 ± 0.23	0.18 ± 0.07	0.33 ± 0.21	0.18 ± 0.11	0.28 ± 0.13
cis-10-Heptadecenoic	0.42 ± 0.10	0.30 ± 0.14	0.39 ± 0.13	0.34 ± 0.10	0.31 ± 0.12	0.36 ± 0.12	0.33 ± 0.12	0.29 ± 0.07
Stearic	3.80 ± 1.57	3.68 ± 1.52	4.35 ± 1.46	4.52 ± 1.43	3.00 ± 0.51	3.83 ± 1.97	3.74 ± 1.35	3.51 ± 0.87
Elaidic	0.22 ± 0.30	0.37 ± 0.58	0.23 ± 0.14	0.35 ± 0.32	0.08 ± 0.04	0.45 ± 0.62	0.10 ± 0.04	0.23 ± 0.20
Oleic	17.61 ± 6.06	26.1 ± 12.39	15.40 ± 4.01	15.24 ± 7.20	17.33 ± 1.76	25.71 ± 8.90	18.52 ± 3.13	23.6 ± 19.62
Vaccenic	5.11 ± 1.57	4.66 ± 0.85	5.86 ± 2.01	6.55 ± 1.90	5.17 ± 1.84	5.27 ± 1.41	5.50 ± 0.66	4.57 ± 2.25
Linoleic	2.57 ± 2.23	7.15 ± 6.85	1.86 ± 0.55	4.54 ± 7.46	2.16 ± 0.47	8.18 ± 6.46	2.16 ± 0.53	10.82 ± 8.68
Arachidic	0.14 ± 0.06	0.15 ± 0.07	0.16 ± 0.04	0.19 ± 0.06	0.11 ± 0.02	0.14 ± 0.05	0.11 ± 0.04	0.13 ± 0.04
g-Linolenic-Acid	0.17 ± 0.30	0.08 ± 0.03	0.12 ± 0.14	0.14 ± 0.13	0.09 ± 0.02	0.09 ± 0.04	0.10 ± 0.05	0.09 ± 0.05
cis-11-Eicosenoic	11.17 ± 5.39	5.44 ± 5.55	9.89 ± 5.67	8.29 ± 6.00	16.69 ± 1.31	6.96 ± 4.96	14.77 ± 5.67	5.60 ± 4.90
Linolenic	0.93 ± 0.90	3.21 ± 3.08	0.77 ± 0.40	1.60 ± 2.99	0.84 ± 0.42	2.80 ± 2.47	0.66 ± 0.23	3.34 ± 2.54
Eicosadienoic	0.59 ± 0.49	0.71 ± 0.73	0.90 ± 0.95	0.59 ± 0.38	0.65 ± 0.88	0.79 ± 0.52	0.33 ± 0.08	1.08 ± 0.39
Behenic	0.11 ± 0.09	0.07 ± 0.04	0.09 ± 0.08	0.04 ± 0.04	0.03 ± 0.02	0.07 ± 0.11	0.08 ± 0.13	0.06 ± 0.04
Eicosatrienoic-3ω6	0.08 ± 0.04	0.10 ± 0.06	0.08 ± 0.03	0.07 ± 0.02	0.06 ± 0.02	0.11 ± 0.07	0.07 ± 0.02	0.12 ± 0.05
Erucic	2.21 ± 5.88	0.64 ± 0.52	0.95 ± 0.35	0.96 ± 0.76	0.86 ± 0.25	0.49 ± 0.30	0.86 ± 0.21	0.48 ± 0.29
Eicosatrienoic-3ω3	0.16 ± 0.08	0.20 ± 0.11	0.15 ± 0.05	0.17 ± 0.08	0.12 ± 0.03	0.23 ± 0.13	0.10 ± 0.02	0.23 ± 0.11
Arachidonic	0.64 ± 0.34	0.70 ± 0.69	0.95 ± 0.65	1.02 ± 1.01	0.30 ± 0.16	0.60 ± 0.30	0.39 ± 0.31	0.68 ± 0.47
Docosadienoic	0.75 ± 0.23	0.52 ± 0.35	0.68 ± 0.33	0.32 ± 0.15	0.54 ± 0.33	0.56 ± 0.31	0.47 ± 0.29	0.62 ± 0.35
Lignoceric	0.05 ± 0.04	0.04 ± 0.02	0.12 ± 0.17	0.03 ± 0.03	0.14 ± 0.36	0.23 ± 0.63	0.03 ± 0.01	0.05 ± 0.04
Eicosapentaenoic	7.49 ± 3.45	6.13 ± 3.20	7.97 ± 2.76	4.17 ± 2.71	5.26 ± 3.00	6.18 ± 2.57	6.02 ± 3.50	6.77 ± 3.71
Nervonic	0.71 ± 0.30	0.57 ± 0.43	1.25 ± 1.83	0.71 ± 0.39	0.55 ± 0.10	0.40 ± 0.27	0.53 ± 0.18	0.39 ± 0.20
Docosatetraenoic	0.10 ± 0.15	0.05 ± 0.09	0.07 ± 0.10	0.06 ± 0.09	0.07 ± 0.13	0.02 ± 0.01	0.04 ± 0.08	0.11 ± 0.12
Docosapentaenoic	0.09 ± 0.07	0.08 ± 0.06	0.13 ± 0.09	0.14 ± 0.17	0.04 ± 0.05	0.08 ± 0.05	0.04 ± 0.05	0.10 ± 0.07
Docosahexaenoic	12.46 ± 5.34	9.80 ± 6.52	12.70 ± 6.06	5.61 ± 4.03	8.39 ± 5.09	8.02 ± 4.30	8.80 ± 5.46	8.97 ± 6.88

Table S2. Results of linear mixed models examining the temporal trends of fatty acids in Northeast Arctic cod (NEAC) and Norwegian coastal cod (NCC), as a percentage of total fatty acids. * p<0.05, ** p<0.001.

FA	Genotype	term	estimate	std.error	statistic	p.value
Oleic	NCC	(Intercept)	-8.81e+00	3.48e+02	-0.0252	0.9798
Oleic	NCC	Date	-3.80e-05	4.87e-04	-0.0781	0.9379
Oleic	NEAC	(Intercept)	-1.97e+02	7.05e+02	-0.2798	0.7814
Oleic	NEAC	Date	-3.05e-04	9.86e-04	-0.3096	0.7589
Linoleic	NCC	(Intercept)	3.13e+01	2.07e+02	0.15140	0.8800
Linoleic	NCC	Date	3.85e-05	2.89e-04	0.13292	0.8946
Linoleic	NEAC	(Intercept)	1.85e+02	4.39e+02	0.42075	0.6768
Linoleic	NEAC	Date	2.51e-04	6.15e-04	0.40912	0.6852
Linolenic	NCC	(Intercept)	3.25e+01	8.94e+01	0.36408	0.7168
Linolenic	NCC	Date	4.33e-05	1.25e-04	0.34680	0.7297
Linolenic	NEAC	(Intercept)	1.50e+02	1.45e+02	1.03276	0.3097
Linolenic	NEAC	Date	2.07e-04	2.03e-04	1.02111	0.3151
Arachidonic	NCC	(Intercept)	-1.73e+01	2.75e+01	-0.6279	0.5319
Arachidonic	NCC	Date	-2.53e-05	3.85e-05	-0.65770	0.5127
Arachidonic	NEAC	(Intercept)	-9.78e+00	2.48e+01	-0.39431	0.6960
Arachidonic	NEAC	Date	-1.43e-05	3.46e-05	-0.41326	0.6822
Eicosapentaenoic	NCC	(Intercept)	-6.78e+01	1.32e+02	-0.51282	0.6096
Eicosapentaenoic	NCC	Date	-1.04e-04	1.84e-04	-0.56280	0.5752
Eicosapentaenoic	NEAC	(Intercept)	3.94+02	2.25e+02	1.74830	0.0903
Eicosapentaenoic	NEAC	Date	5.42e-04	3.15e-04	1.72173	0.0950
Docosahexaenoic	NCC	(Intercept)	-2.44e+02	2.43e+02	-1.0051	0.3181
Docosahexaenoic	NCC	Date	-3.56e-04	3.40e-04	-1.0481	0.2980
Docosahexaenoic	NEAC	(Intercept)	5.76e+02	3.76e+02	1.5321	0.1356
Docosahexaenoic	NEAC	Date	7.93e-04	5.25e-04	1.5094	0.1412

Table S3. Results of linear mixed models examining temporal trends of the fatty acid indices in Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC). * p<0.05, ** p<0.001.

FA Indices	Genotype	term	estimate	std.error	statistic	p.value
ω3	NCC	(Intercept)	-2.68e+02	3.87e+02	-0.6934	0.4902
ω3	NCC	Date	-4.05e-04	5.42e-04	-0.7481	0.4567
ω3	NEAC	(Intercept)	1.16+03	7.10e+02	1.6322	0.1127
ω3	NEAC	Date	1.59e-03	9.93e-04	1.6043	0.1187
ω6	NCC	(Intercept)	1.33+01	2.06e+02	0.0645	0.9486
ω6	NCC	Date	9.92e-06	2.88e-04	0.0344	0.9726
ω6	NEAC	(Intercept)	2.9e+02	4.67e+02	0.6265	0.5355
ω6	NEAC	Date	4.0e-04	6.54e-04	0.6115	0.5452
SFA	NCC	(Intercept)	-5.48e+01	4.33e+02	-0.1266	0.8995
SFA	NCC	Date	-1.24e-04	6.05e-04	-0.2057	0.8375
SFA	NEAC	(Intercept)	-4.07e+02	5.82e+02	-0.7004	0.4888
SFA	NEAC	Date	-6.10e-04	8.14e-04	-0.7504	0.4586
MUFA	NCC	(Intercept)	4.09e+02	3.65e+02	1.1200	0.2663
MUFA	NCC	Date	5.15e-04	5.11e-04	1.0088	0.3163
MUFA	NEAC	(Intercept)	-9.10e+02	6.11e+02	-1.4892	0.1465
MUFA	NEAC	Date	-1.33e-03	8.55e-04	-1.5669	0.1272
PUFA	NCC	(Intercept)	-2.54e+02	4.46e+02	-0.5694	0.5708
PUFA	NCC	Date	-3.90e-04	6.24e-04	-0.6256	0.5335
PUFA	NEAC	(Intercept)	1.41e+03	8.57e+02	1.6542	0.1081
PUFA	NEAC	Date	1.95e-03	1.19e-03	1.6269	0.1138
DHA_EPA	NCC	(Intercept)	-5.16e+01	2.30e+01	-2.2399	0.0281
DHA_EPA	NCC	Date	-7.44e-05	3.22e-05	-2.3080	0.0238*
DHA_EPA	NEAC	(Intercept)	1.27e+01	2.99e+01	0.4238	0.6745
DHA_EPA	NEAC	Date	1.59e-05	4.19e-05	0.3794	0.7069
EPA_ARA	NCC	(Intercept)	3.07e+02	2.64e+02	1.2600	0.1553
EPA_ARA	NCC	Date	4.16e-04	4.21e-04	1.00784	0.2143
EPA_ARA	NEAC	(Intercept)	-6.10e+02	5.12e+02	-1.3791	0.1355
EPA_ARA	NEAC	Date	-1.21e-03	7.42e-04	-1.4239	0.1163

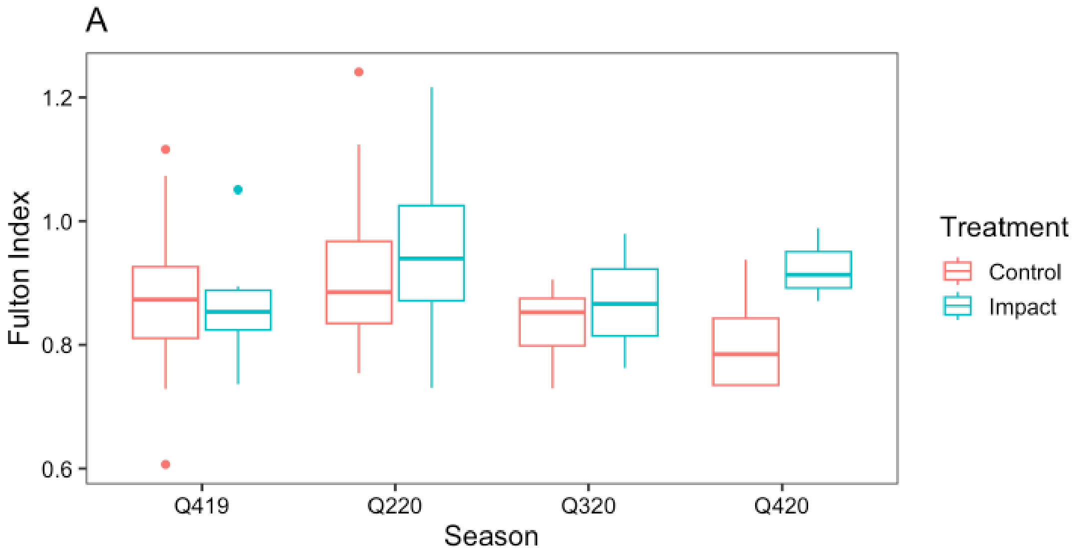
Table S4. Results of linear mixed models examining the percentage of fatty acid concentrations in Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) according to fish age. * p<0.05, ** p<0.001.

FA	Genotype	term	estimate	std.error	statistic	p.value
Oleic	NCC	(Intercept)	14.7040	2.5063	5.8668	0.0000
Oleic	NCC	Age	0.7602	0.4602	1.6520	0.1029
Oleic	NEAC	(Intercept)	27.5586	4.6211	5.9637	0.0000
Oleic	NEAC	Age	-0.9742	0.7121	-1.3680	0.1830
Linoleic	NCC	(Intercept)	5.5213	1.5081	3.6610	0.0005
Linoleic	NCC	Age	-0.3339	0.2769	-1.2059	0.2318
Linoleic	NEAC	(Intercept)	10.6123	2.7770	3.8216	0.0007
Linoleic	NEAC	Age	-0.8307	0.4279	-1.9412	0.0631
Linolenic	NCC	(Intercept)	2.2286	0.6514	3.4215	0.0010
Linolenic	NCC	Age	-0.1343	0.1196	-1.1230	0.2652
Linolenic	NEAC	(Intercept)	3.7057	0.9177	4.0381	0.0004
Linolenic	NEAC	Age	-0.3076	0.1414	-2.1754	0.0389*
Arachidonic	NCC	(Intercept)	0.9672	0.2001	4.8335	0.0000
Arachidonic	NCC	Age	-0.0319	0.0367	-0.8677	0.3885
Arachidonic	NEAC	(Intercept)	0.8462	0.1503	5.6285	0.0000
Arachidonic	NEAC	Age	-0.0592	0.0232	-2.5553	0.0168*
Eicosapentaenoic	NCC	(Intercept)	6.7435	0.9713	6.9427	0.0000
Eicosapentaenoic	NCC	Age	-0.0209	0.1783	-0.1172	0.9070
Eicosapentaenoic	NEAC	(Intercept)	6.9807	1.5585	4.4790	0.0001
Eicosapentaenoic	NEAC	Age	-0.1547	0.2402	-0.6441	0.5251
Docosahexaenoic	NCC	(Intercept)	9.0525	1.7938	5.0465	0.0000
Docosahexaenoic	NCC	Age	0.2854	0.3294	0.8666	0.3890
Docosahexaenoic	NEAC	(Intercept)	9.7325	2.5807	3.7712	0.0008
Docosahexaenoic	NEAC	Age	0.2854	0.3294	0.8666	0.3890

Table S5. Results of linear mixed models examining the Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) fatty acid indices with respect to fish age. * p<0.05, ** p<0.001.

FA indices	Genotype	term	estimate	std.error	statistic	pvalue
ω3	NCC	(Intercept)	21.6527	2.8569	7.5791	0.0000
ω3	NCC	Age	-0.0810	0.5246	-0.1544	0.8777
ω3	NEAC	(Intercept)	27.6949	4.6639	5.9382	0.0000
ω3	NEAC	Age	-1.2188	0.7187	-1.6957	0.1019
ω6	NCC	(Intercept)	8.0391	1.4973	5.3690	0.0000
ω6	NCC	Age	-0.3595	0.2749	-1.3076	0.1952
ω6	NEAC	(Intercept)	13.4544	2.9003	4.6390	0.0001
ω6	NEAC	Age	-0.9786	0.4470	-2.1896	0.0377*
SFA	NCC	(Intercept)	37.2789	3.1322	11.9018	0.0000
SFA	NCC	Age	-0.6411	0.5751	-1.1148	0.2687
SFA	NEAC	(Intercept)	30.2046	3.9242	7.6971	0.0000
SFA	NEAC	Age	-0.2164	0.6047	-0.3579	0.7233
MUFA	NCC	(Intercept)	36.3220	2.6380	13.7686	0.0000
MUFA	NCC	Age	0.8820	0.4844	1.8210	0.0728
MUFA	NEAC	(Intercept)	35.5527	3.5270	10.0802	0.0000
MUFA	NEAC	Age	1.8907	0.5435	3.4786	0.0018**
PUFA	NCC	(Intercept)	26.3992	3.2848	8.0366	0.0000
PUFA	NCC	Age	-0.2409	0.6031	-0.3994	0.6908
PUFA	NEAC	(Intercept)	34.2427	5.5479	6.1722	0.0000
PUFA	NEAC	Age	-1.6743	0.8550	-1.9583	0.0610
DHA_EPA	NCC	(Intercept)	1.3934	0.1727	8.0663	0.0000
DHA_EPA	NCC	Age	0.0367	0.0317	1.1571	0.2510
DHA_EPA	NEAC	(Intercept)	1.553	0.1931	7.0204	0.0000
DHA_EPA	NEAC	Age	0.0215	0.0198	1.1625	0.2748
EPA_ARA	NCC	(Intercept)	11.5517	2.3569	6.4781	0.0000
EPA_ARA	NCC	Age	-0.0710	0.4247	-0.1432	0.8777
EPA_ARA	NEAC	(Intercept)	18.2459	3.6649	4.8322	0.0000
EPA_ARA	NEAC	Age	-1.3178	0.8297	-1.7857	0.1139

Figure S1. Changes in cod (A) Fulton index and (B) hepatosomatic index by sampling season regarding to treatments.



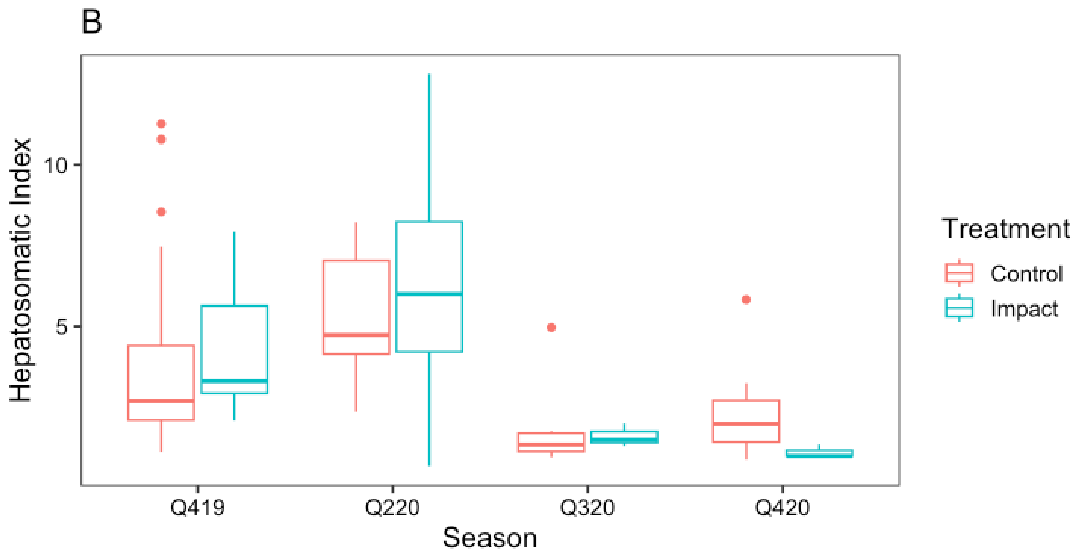


Figure S2. Temporal trend of fatty acid concentrations as percentages for the Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments. Sampling days: 8/10/2019, 9/10/2019, 10/10/2019, 14/10/2019, 15/10/2019, 16/10/2019, 17/10/2019, 8/4/2020, 16/4/2020, 10/5/2020, 11/5/2020, 12/5/2020, 13/5/2020, 19/5/2020, 7/7/2020, 8/7/2020, 30/9/2020, 03/10/2020 and 4/10/2020. Sampling size: NEAC=33, NCC= 75.

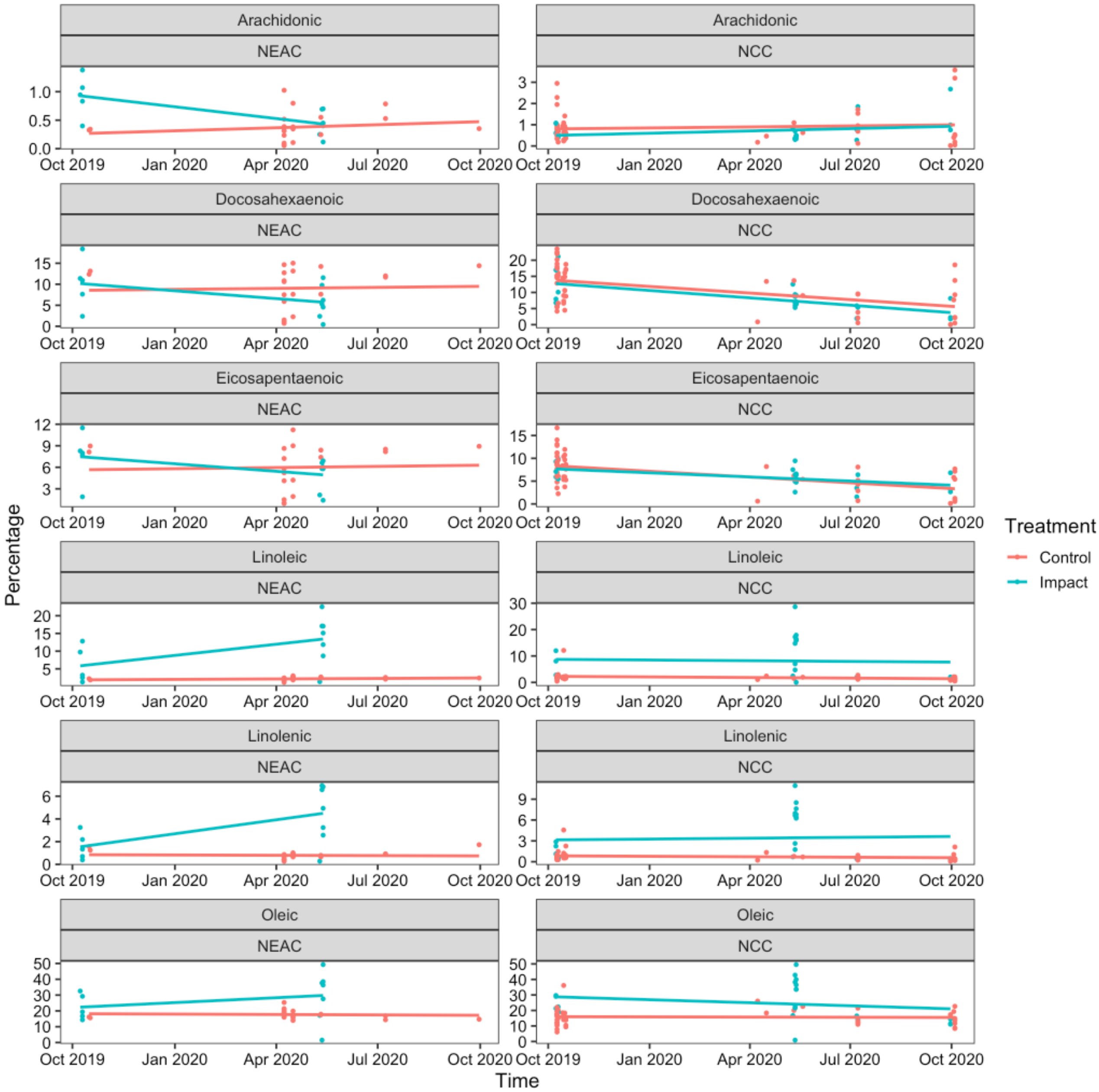


Figure S3. Temporal trend of fatty acid indices for Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments. (DHA_EPA=DHA/EPA, EPA_ARA=EPA/ARA, MUFA= monounsaturated fatty acids, PUFA = polyunsaturated fatty acids, SFA = saturated fatty acids, ω3 = total omega-3 fatty acids, ω6 = total omega-6 fatty acids). Sampling days: 8/10/2019, 9/10/2019, 10/10/2019, 14/10/2019, 15/10/2019, 16/10/2019, 17/10/2019, 8/4/2020, 16/4/2020, 10/5/2020, 11/5/2020, 12/5/2020, 13/5/2020, 19/5/2020, 7/7/2020, 8/7/2020, 30/9/2020, 03/10/2020 and 4/10/2020. Sampling size: NEAC=33, NCC= 75.

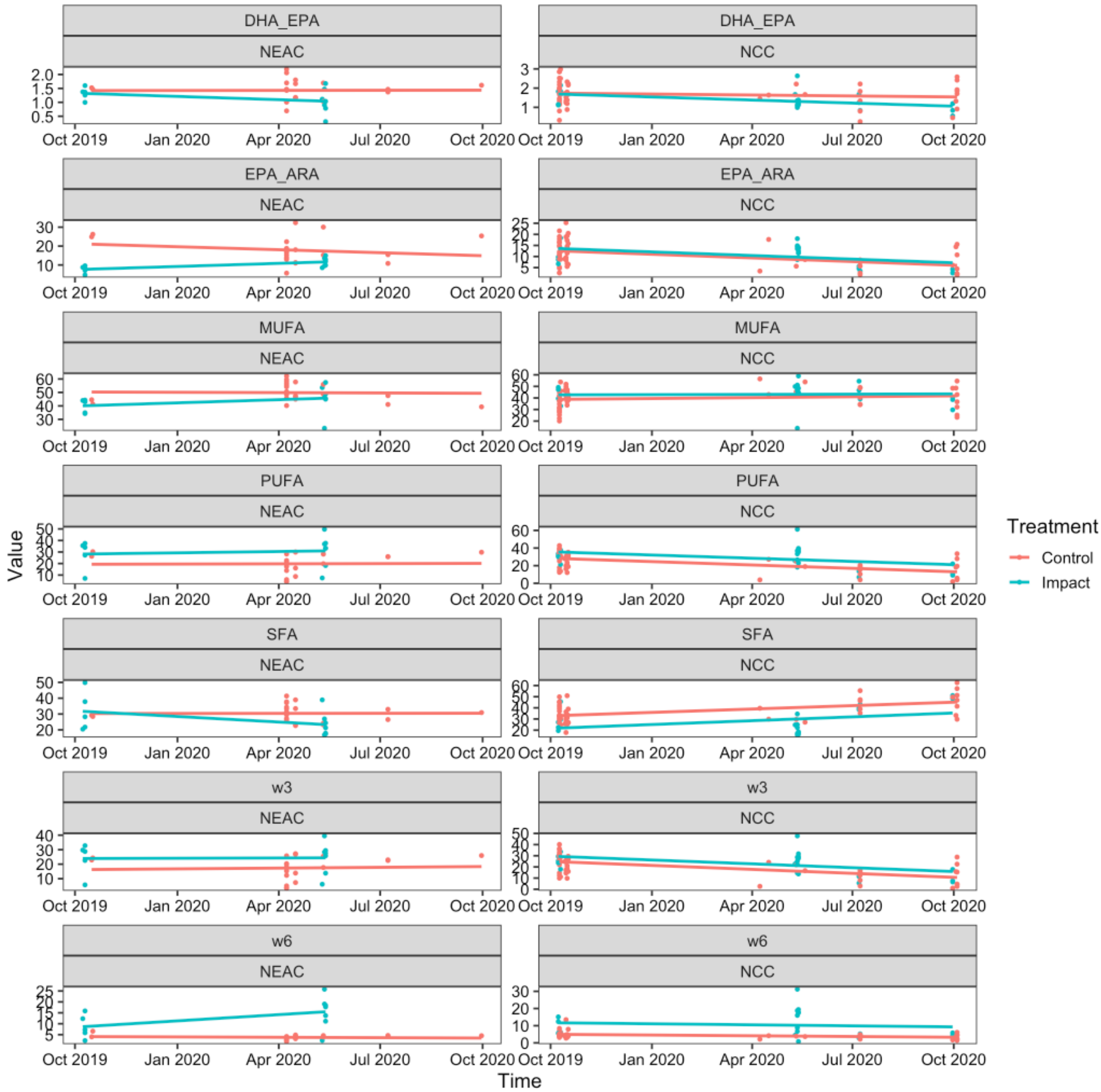


Figure S4. Regression of fatty acid concentrations as percentages for the Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments according to cod age (years). Sampling size: NEAC=33, NCC= 75.

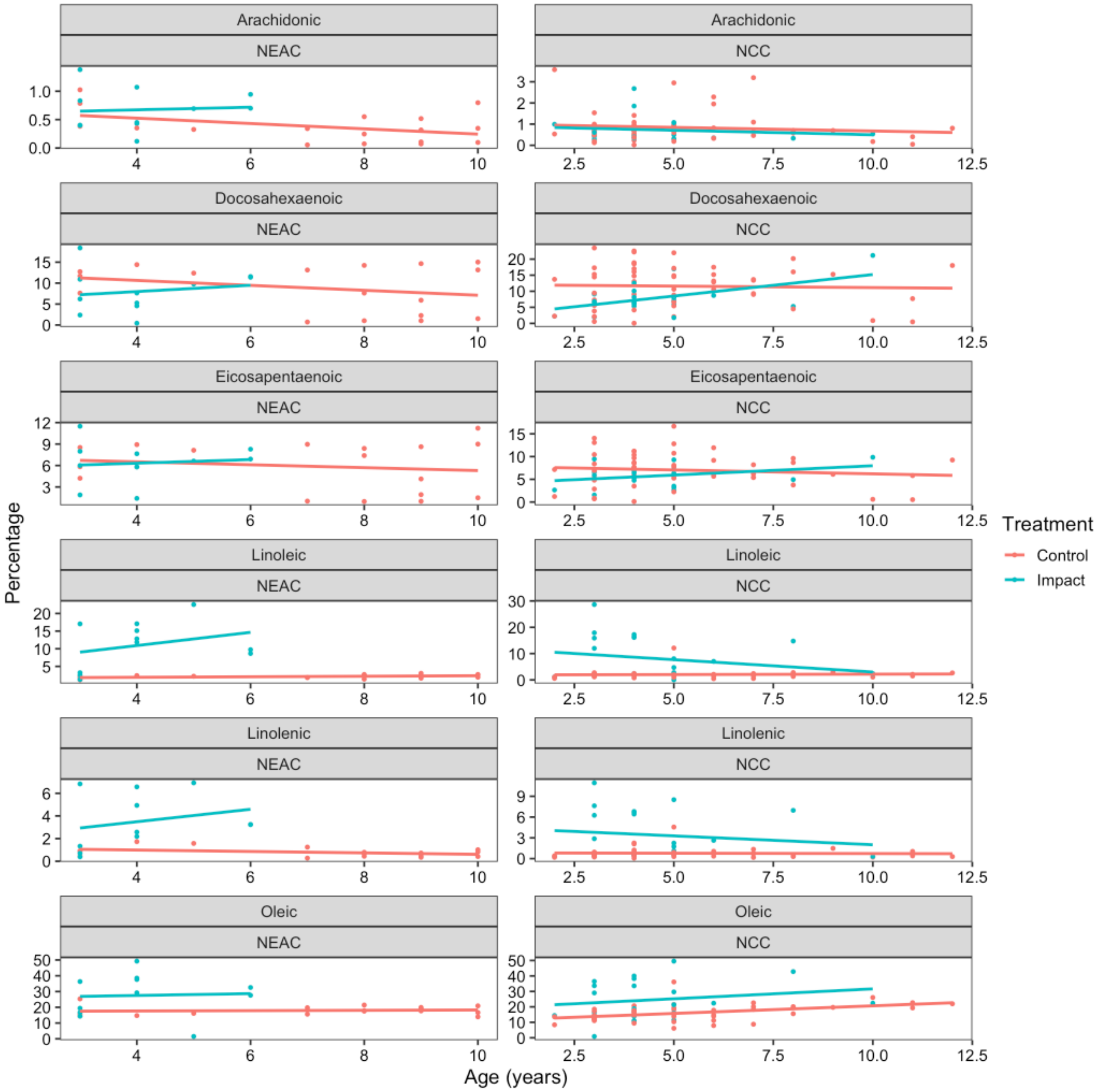


Figure S5. Regression of fatty acid concentrations as percentages for the Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments according to cod age (years). DHA_EPA=DHA/EPA, EPA_ARA=EPA/ARA, MUFA= monounsaturated fatty acids, PUFA = polyunsaturated fatty acids, SFA = saturated fatty acids, ω3 = total omega-3 fatty acids, ω6 = total omega-6 fatty acids. Sampling size: NEAC=33, NCC= 75.

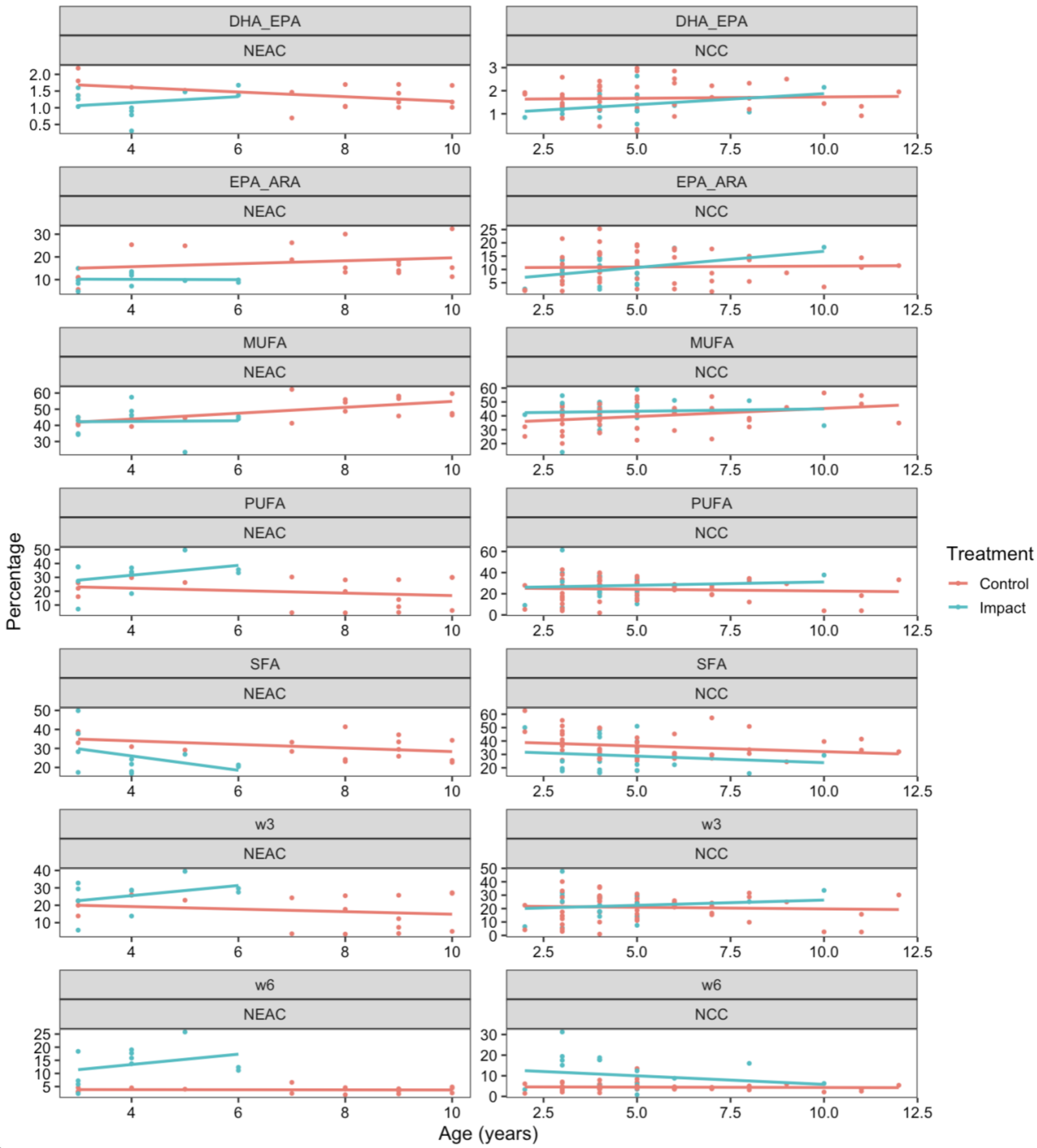


Figure S6. Changes in fatty acid percentages for Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments according to location.

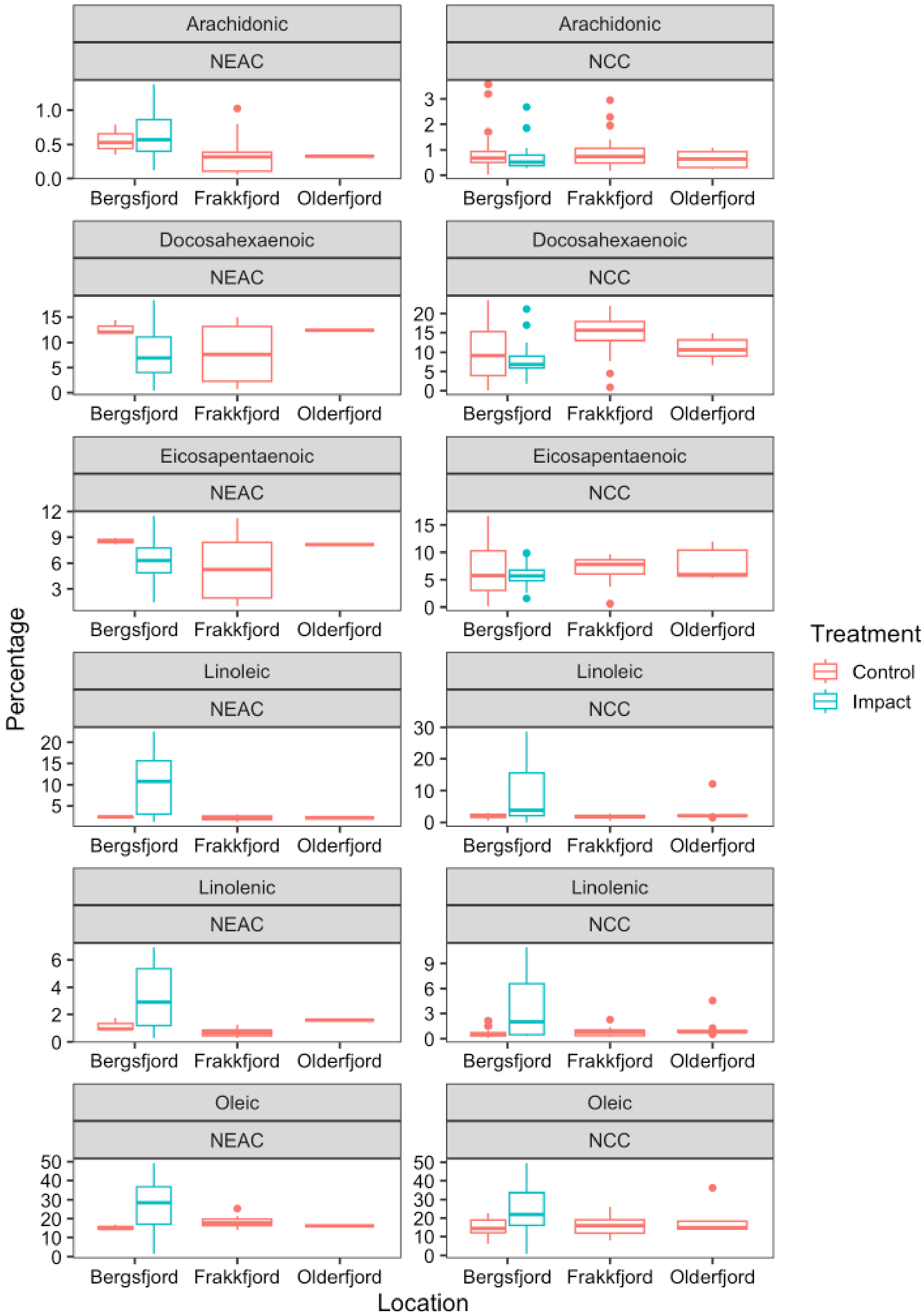


Figure S7. Changes in fatty acid indices for Northeast Arctic cod (NEAC) and (NCC) Northeast Arctic cod (NEAC) for the control and impact treatments according to location. DHA_EPA=DHA/EPA, EPA_ARA=EPA/ARA, MUFA= monounsaturated fatty acids, PUFA = polyunsaturated fatty acids, SFA = saturated fatty acids, ω3 = total omega-3 fatty acids, ω6 = total omega-6 fatty acids.