Supplementary Figure 1 Composition of lipid classes in gut (G), liver (L) and muscle (M) of seawater (SW) and freshwater (FW) salmon during diet switch from fish oil to vegetable oil (MAVO) or vice versa (VOMA). CE, cholesterol ester; FC, free cholesterol; Cer, Ceramides; HexCer, Hexosyl ceramide; DG, Diacylglycerol; LPC, Lysophosphatidylcholine; LPE, Lysophosphatidylethanolamine; MG, monoacylglycerol; PC, phosphatidylincholine; PE, phosphatidylethanolamine; PG, phosphatidylglycerol; SM, Sphingomyelin; TG, Triacylglycerol.
Supplementary Figure 2 PCA plots for lipid species of each lipid class between SW and FW salmon during diet switch.
Supplementary Figure 3
**Supplementary Table 1** The composition of fish oil and vegetable oil diets (% of DW diet) for freshwater and seawater salmon and the fatty acid profile of each diet (% of total lipid fraction).

| Feed composition % of total dry weight | Freshwater | Seawater |
|---------------------------------------|------------|----------|
|                                       | Fish Oil   | Vegetable Oil |
| North Atlantic fishmeal                | 30.1       | 30.1     | 25.0       | 25.0       |
| Plant meals                           | 48.4       | 48.4     | 45.9       | 45.9       |
| Additives                             | 3.9        | 3.9      | 3.3        | 3.3        |
| North Atlantic fish oil               | 17.6       | 1.2      | 25.8       | 1.8        |
| Linseed oil                           | 0.0        | 10.5     | 0.0        | 15.4       |
| Palm oil                              | 0.0        | 5.9      | 0.0        | 8.6        |
| Total Protein                         | 47         | 47       | 41         | 41         |
| Total Lipid                           | 22         | 22       | 31         | 31         |

| Fatty acid composition % of total lipid fraction | Freshwater | Seawater |
|-----------------------------------------------|------------|----------|
| 14:0                                          | 6.4        | 1.5      | 6.5        | 1.6        |
| 15:0                                          | 0.5        | 0.1      | 0.6        | 0.1        |
| 16:0                                          | 15.4       | 18.5     | 15.3       | 19.5       |
| 18:0                                          | 2.8        | 3.8      | 3.8        | 4.8        |
| 20:0                                          | 0.1        | 0.2      | 0.1        | 0.1        |
| Total Saturates                              | 25.2       | 24.1     | 26.3       | 26.1       |
| 16:1n7                                        | 4.1        | 0.9      | 3.8        | 0.8        |
| 18:1n9                                        | 16.9       | 23.5     | 14.9       | 23.5       |
| 20:1n9                                        | 8          | 1.4      | 8.2        | 1.4        |
| 22:1n11                                      | 12         | 2.2      | 12.4       | 2.1        |
| Total Monounsaturates                        | 41         | 28       | 39.3       | 27.8       |
| 18:2n6                                        | 4.6        | 12.7     | 4.2        | 12.5       |
| 18:3n6                                        | 0.1        | 0.1      | 0.1        | 0.1        |
| 20:2n6                                        | 2.7        | 0.5      | 3          | 0.5        |
| 20:4n6                                        | 0.3        | 0.1      | 0.3        | 0.1        |
| Total n-6 PUFA                               | 7.7        | 13.4     | 7.6        | 13.2       |
| 18:3n3                                        | 2.11       | 28.8     | 2.5        | 26.8       |
| 20:3n3                                        | 0.2        | 0.1      | 0.3        | 0.1        |
| 20:5n3                                        | 5.8        | 1.3      | 6.2        | 1.4        |
| 22:5n3                                        | 0.9        | 0.2      | 0.8        | 0.2        |
| 22:6n3                                        | 10.7       | 2.3      | 11.7       | 2.7        |
| Total n-3 PUFA                               | 19.71      | 32.7     | 21.5       | 31.2       |
| EPA+DHA                                       | 16.5       | 3.6      | 17.9       | 4.1        |

*The composition of diet and fatty acid were previously published in Gillard, et.al. 2018.*