


## ***Supplementary Material***

### **Drivers of regional bacterial community structure and diversity in the Northwest Atlantic Ocean**

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Running Title: Bacterial community structure of the Scotian Shelf

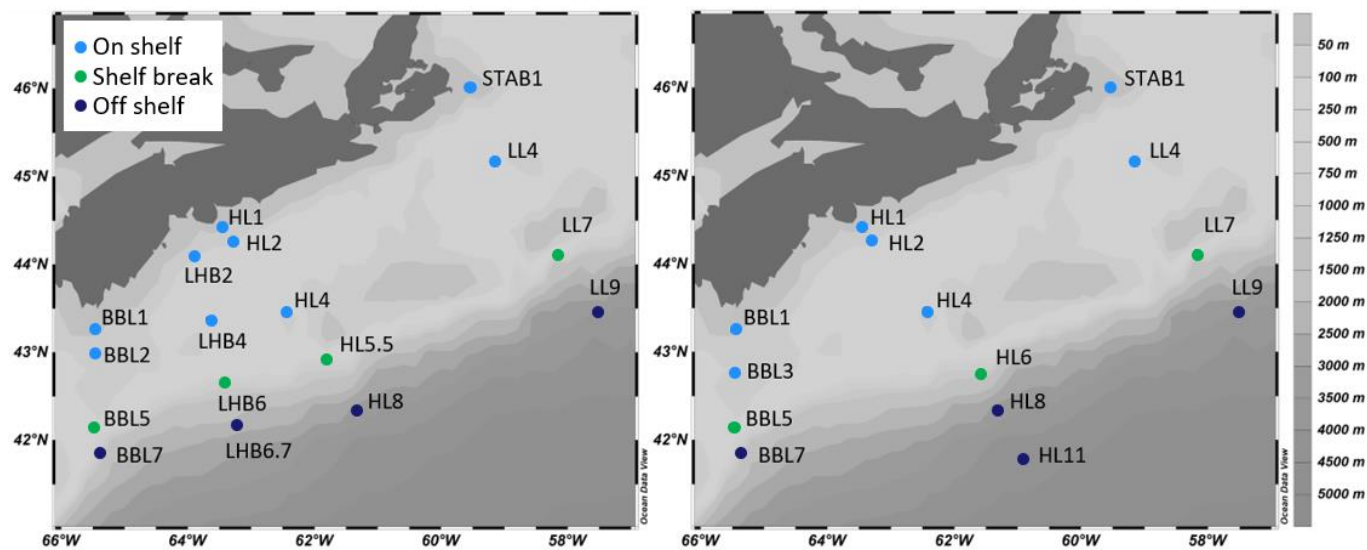


Fig S1. Map of 2014 across shelf transects with zone (on shelf, shelf break, off shelf) indicated by colour.

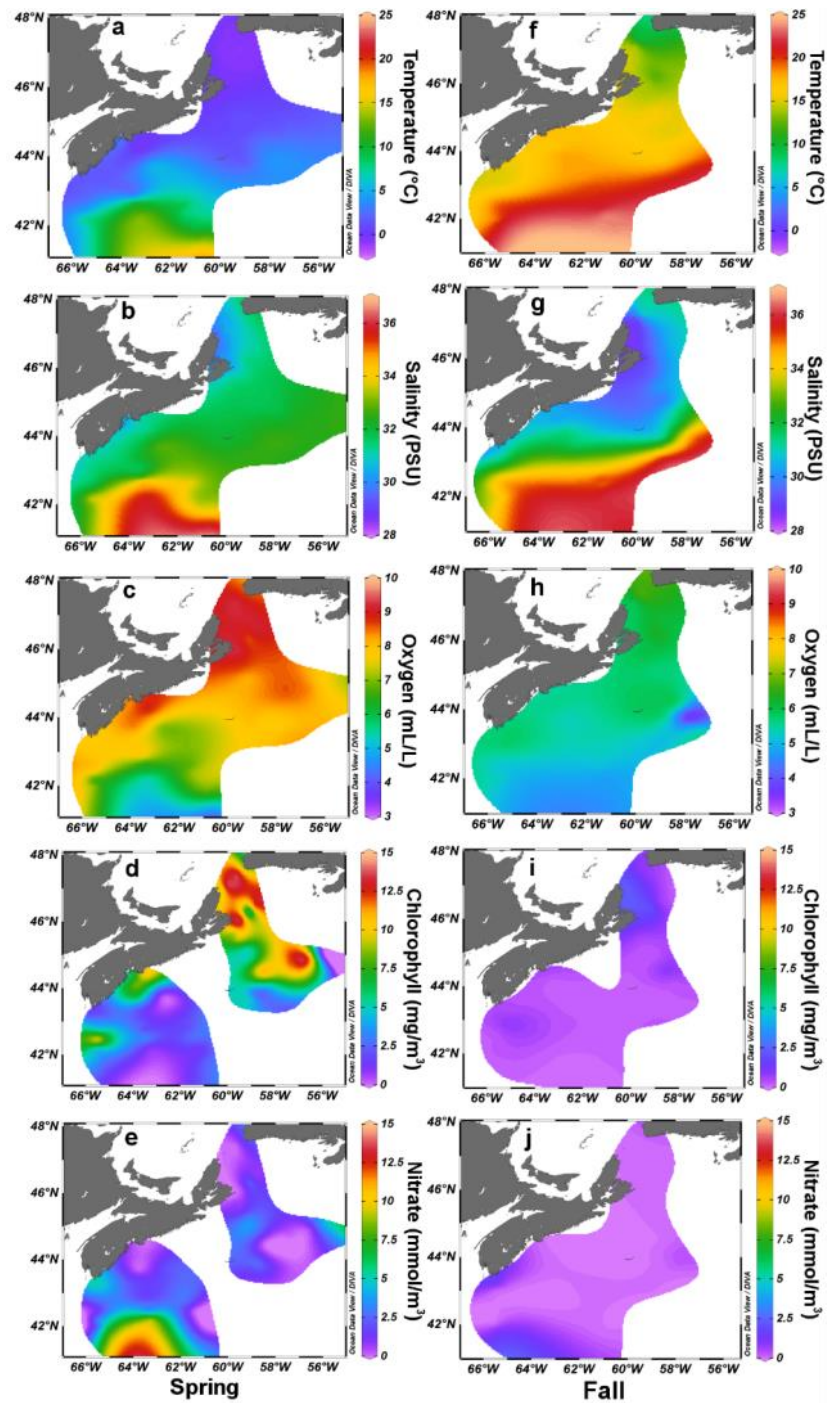


Figure S2 Surface plots of data from spring 2014 (a-e) and fall 2014 (f-j) cruises. Environmental variables displayed include: Temperature (a,f), Salinity (b,g), Oxygen concentration in mL/L (c,h), Chlorophyll concentration in  $\text{mg}/\text{m}^3$  (d,i), and Nitrate concentrations in  $\text{mmol}/\text{m}^3$  (e,j). Slightly different cruise tracks resulted in slightly different coverage of the Scotian Shelf between spring and fall cruises.

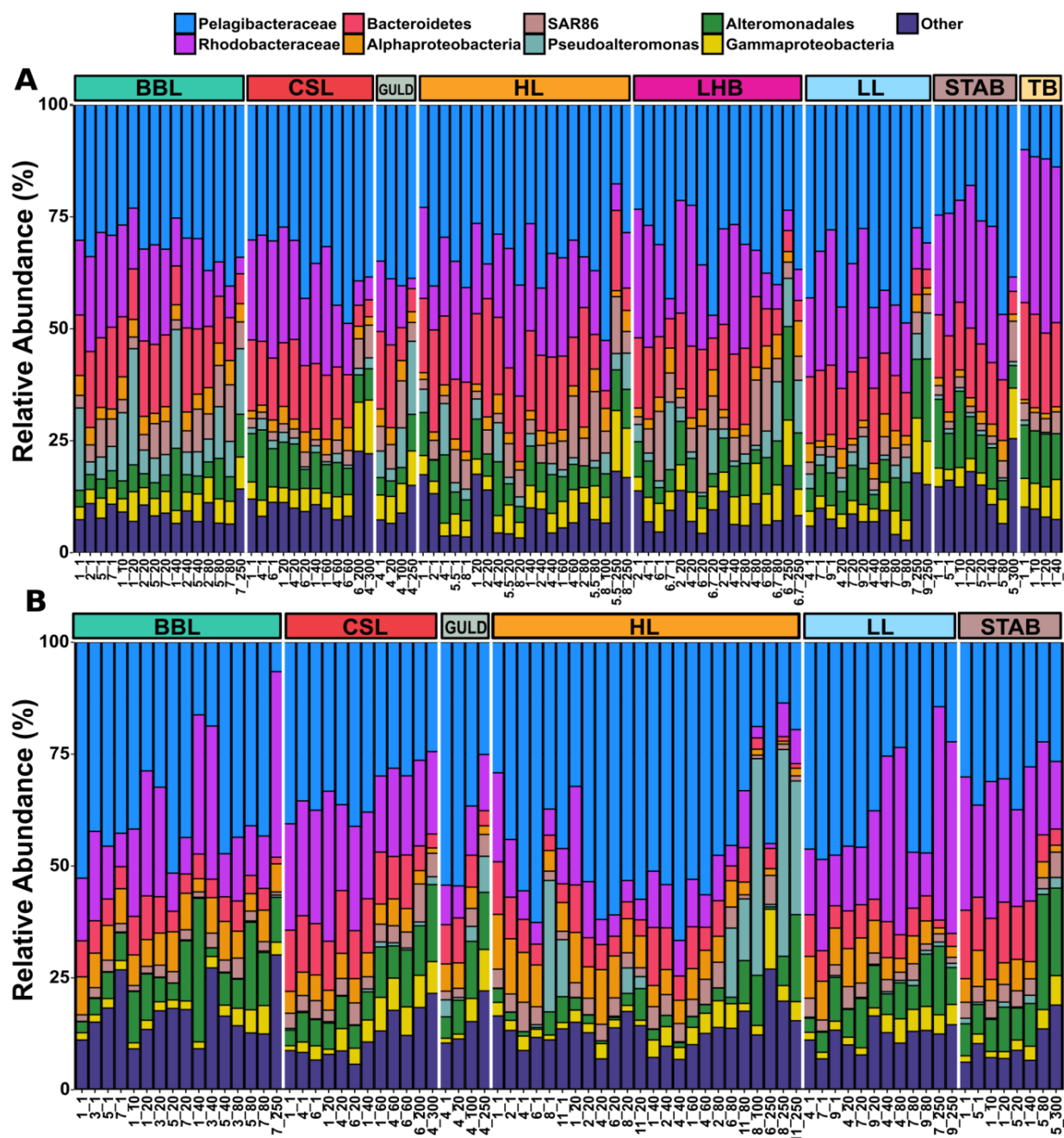


Figure S3. Relative abundance of the most abundant taxa in the free living size fraction on the Scotian Shelf from Spring (A), and Fall (B). Samples are ordered first based on transect, which is displayed along the top of the graph, and then based on depth. The first number along the x-axis refers to the sample station, and the second number refers to the sample depth. Transects: BBL – Browns Bank Line; LHB – LaHave Basin Line; HL – Halifax Line; TB – Thebaud Platform Station; GULD – Gully Station; LL – Louisbourg Line; STAB – St. Anns Bank Line; CSL – Cabot Strait Line.

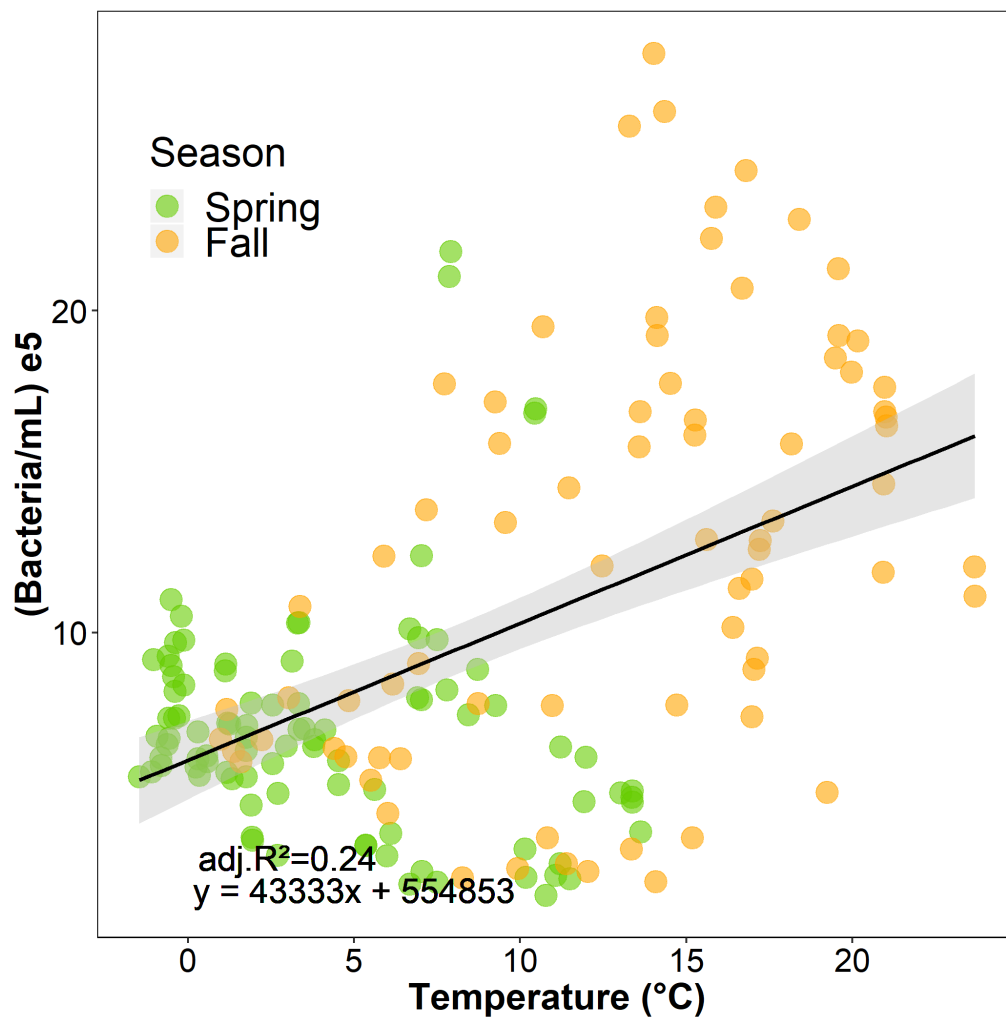


Fig. S4 Correlation of bacterial cell density with temperature across 2014 samples (n=168).

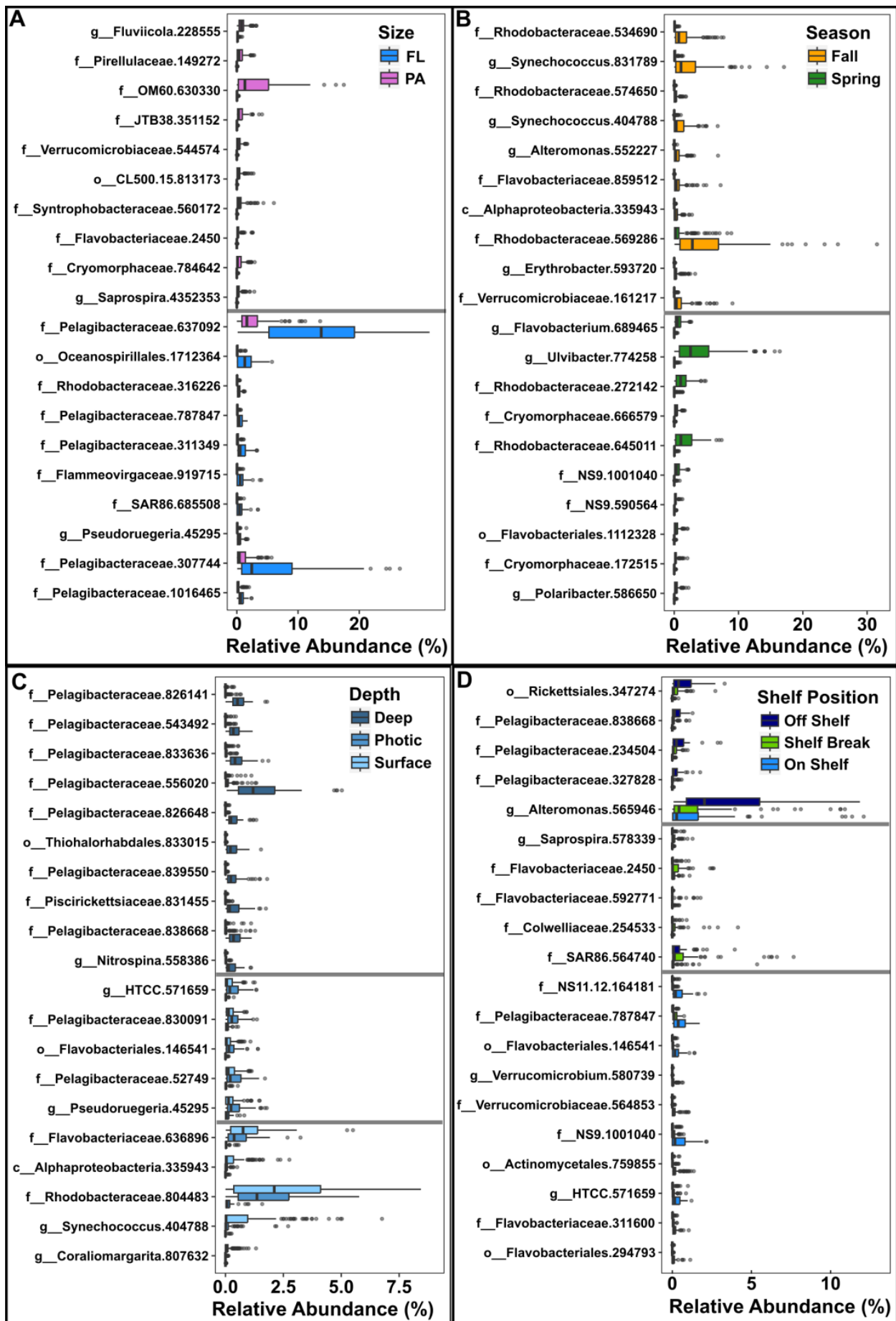


Figure S5. List and relative abundance of the 10 most statistically significant indicator species for A) different size fractions, B) seasons, C) sampling depth and D) location on the shelf. A) The top ten most significant indicator species for each size fraction are shown, PA in the upper panel and FL in the bottom panel. B) The top ten most significant indicator species for each season is shown, fall in the top panel, spring in the bottom panel. C) The top ten most significant indicator species for the deep zone, and the five most significant indicator species for the surface and photic zones are shown, deep zone is in the top layer, photic zone is in the middle layer, and surface zone is in the bottom layer. D) The top 10 indicator species for each of off shelf (top), shelf break (middle) and on shelf (bottom) are shown. OTUs in each panel are ordered with the most significant association listed first and in decreasing strength of association with the statistically significant group. Boxplots of each species show the range of relative abundances of the OTU in each grouping. Note that the x-axes scale is different between the panels.

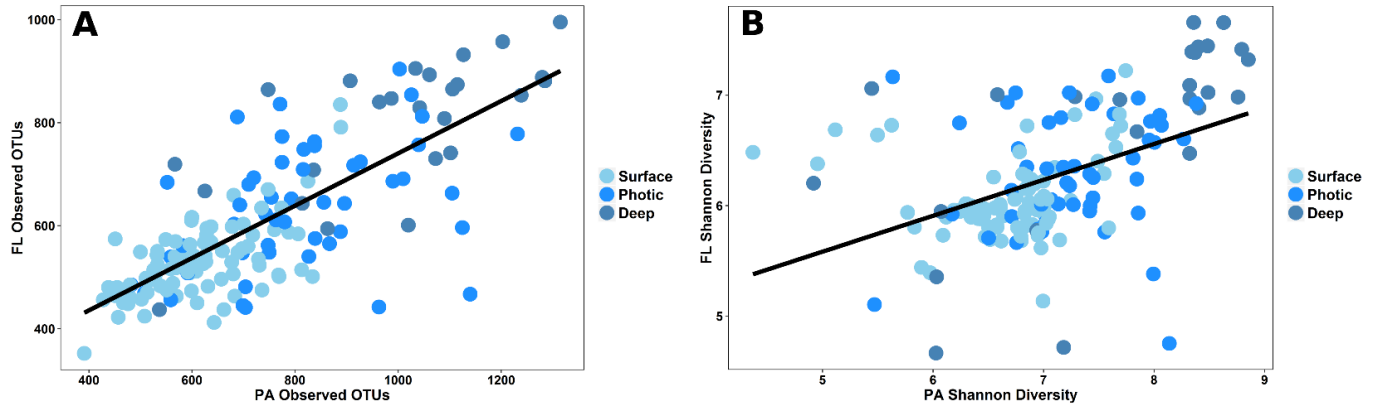


Figure S6. A. Correlation between FL and PA number of observed OTUs. Adjusted  $R^2 = 0.5817$ ,  $p < 0.001$  B. Correlation between FL and PA Shannon Diversity. Adjusted  $R^2 = 0.2079$ ,  $p < 0.001$ . Colours show depth in the water column.



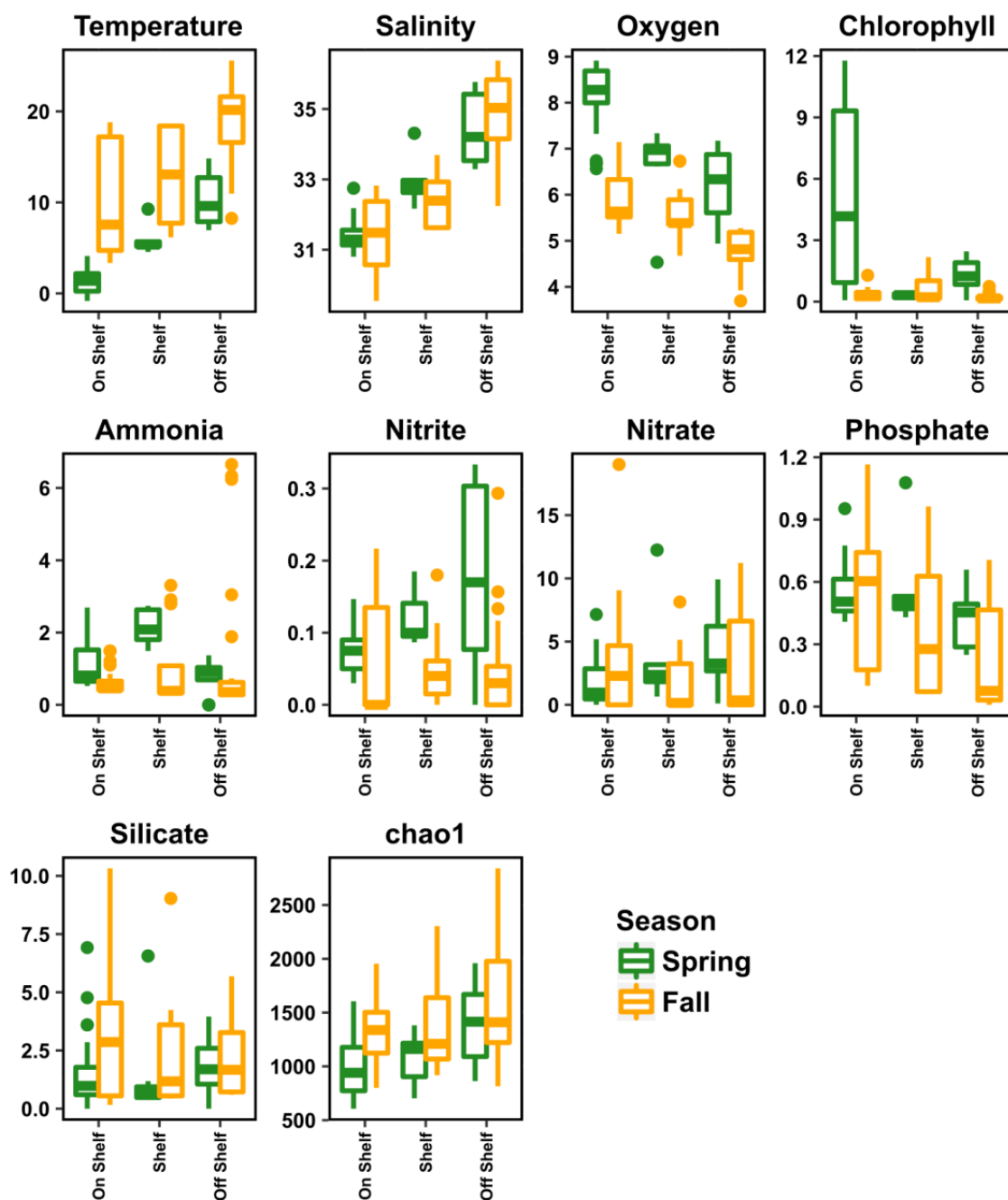
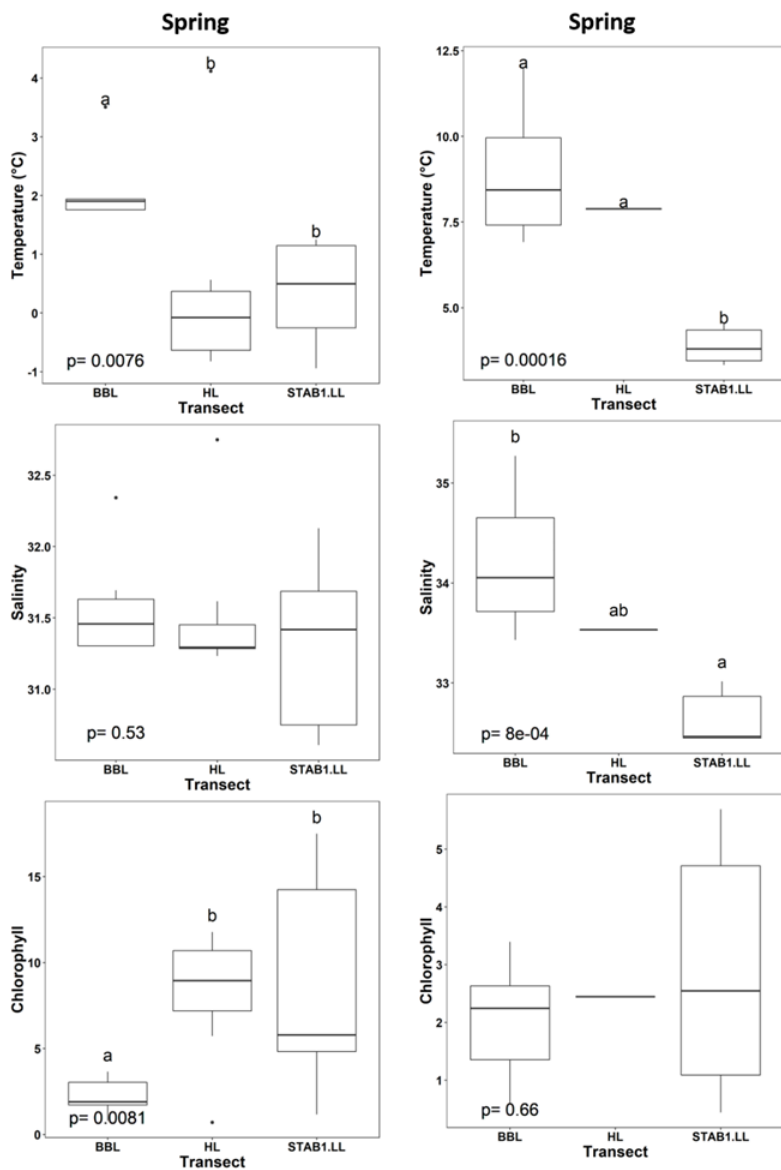


Figure S7. Boxplots showing the ranges of environmental variables in the on shelf, shelf break and off shelf samples (Figure S1) down to 100 m that were used to produce Figure 10. Units are as follows: Salinity (PSU), temperature ( $^{\circ}\text{C}$ ), oxygen ( $\mu\text{mol/kg}$ ), chlorophyll *a* ( $\text{mg/m}^3$ ), ammonium ( $\text{mmol/m}^3$ ), nitrite ( $\text{mmol/m}^3$ ), nitrate ( $\text{mmol/m}^3$ ), phosphate ( $\text{mmol/m}^3$ ), silicate ( $\text{mmol/m}^3$ ), chao1 (estimated number of OTUs).

## A On shelf



## B On shelf

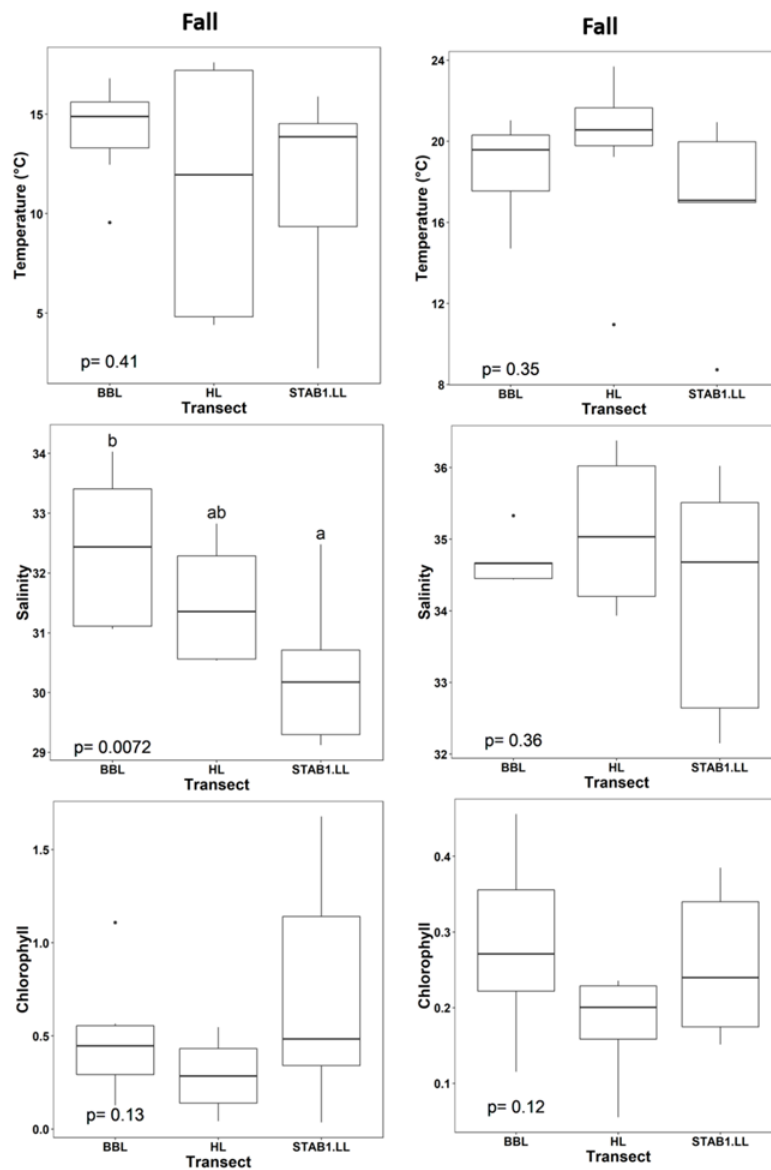
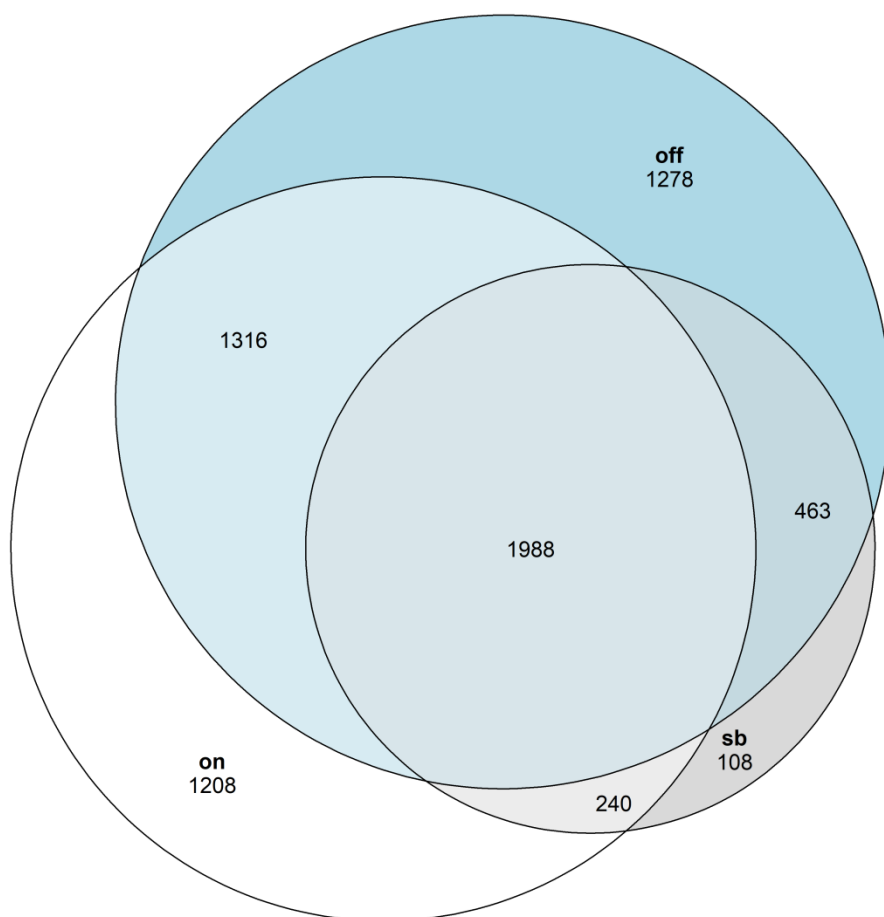


Figure S8. Boxplots of the Temperature ( $^{\circ}\text{C}$ ), Salinity (PSU) and Chlorophyll a concentrations ( $\text{mg}/\text{m}^3$ ), in on shelf and off shelf sections of the BBL, HL and STAB transects in A) spring and B) fall cruises.



% shared OTUs	Shelf Break (sb)	on-shelf (on)	off-shelf (off)
All	71.0	41.8	39.4
on-shelf/shelf break	79.6	46.9	N/A
off-shelf/shelf break	87.6	N/A	48.6
off-shelf/on-shelf	N/A	69.5	65.5
Unique	3.9	25.4	25.3

Figure S9. Venn diagram showing the number of shared OTUs between the on-shelf, off-shelf and shelf break regions. The table below shows the percentage of shared OTUs out of the total number of OTUs for that region.

### Supplementary Tables

Table S1. List of stations and depth sampled along the Halifax Line (HL) during 2014 and 2016 Spring and Fall missions. Y indicates that the station (and depth) was sampled and N indicates that it was not sampled.

Station	Latitude	Latitude2	Depths	2014 Spring	2014 Fall	2016 Spring	2016 Fall
HL1	44.4005	-63.4499	1	Y	Y	Y	Y
			20	Y	Y	Y	Y
			40	Y	Y	Y	Y
			60	Y	Y	Y	Y
HL2	44.2664	-63.3169	1	Y	Y	Y	Y
			20	Y	Y	Y	Y
			40	Y	Y	Y	Y
			80	Y	Y	Y	Y
HL4	43.4813	-62.4541	1	Y	Y	Y	Y
			20	Y	Y	Y	Y
			40	Y	Y	Y	Y
			60	Y	Y	Y	Y
HL5.5	42.9396	-61.8342	1	Y	N	Y	Y
			20	Y	N	Y	Y
			80	Y	N	Y	Y
			250	Y	N	Y	Y
HL6	42.8321	-61.7324	1	N	Y	Y	Y
			20	N	Y	Y	Y
			50	N	N	Y	Y
			80	N	Y	Y	Y
			250	N	Y	N	N
HL7	42.4763	-61.4359	1	N	N	Y	Y
			20	N	N	Y	Y
			50	N	N	Y	Y
			80	N	N	Y	Y
HL8	42.3623	-61.3384	1	Y	Y	N	Y
			20	Y	Y	N	N
			60	N	N	N	Y
			100	Y	Y	N	Y
			250	Y	Y	N	Y
HL11	41.7778	-60.9077	1	N	Y	N	Y
			20	N	Y	N	N
			45	N	N	N	Y
			80	N	Y	N	N
			100	N	N	N	Y
HL2Ret	44.2664	-63.3169	250	N	Y	N	Y
			1	N	N	Y	Y
			20	N	N	Y	Y
			40	N	N	Y	Y
			80	N	N	Y	Y

Table S2. List of stations describing sampling depth, geographical coordinates and physiochemical characteristics of the water samples from 2014. (Excel file)

Table S3. List of dual-indexing Illumina fusion primers used for Multiplexing samples for Illumina Sequencing (Excel file)

Table S4. List of dominant OTUs overall and in spring and fall

Taxon (OTU#)	fraction	Overall (%)	Spring (%)	Fall (%)
<i>Pseudoalteromonas</i> sp. OTU#827726),	FL			
Pelagibacteraceae (OTU#637092)	FL	13	16	
Pelagibacteraceae (OTU#307744)	FL	6		
Rhodobacteraceae (OTU#569286)	FL	4		
<i>Pseudoalteromonas</i> sp. OTU#827726,	FL		4	
Rhodobacteraceae sp. OTU#804483	FL		3	
Pelagibacteraceae OTU#307744	FL			10
Pelagibacteraceae OTU#637092	FL			10
Rhodobacteraceae sp. OTU#569286	FL			7
<i>Alteromonas</i> sp. OTU#565946	PA	4		
<i>Ulvibacter</i> sp. OTU#774258	PA	3		
OM60 OTU#630330	PA	3	4	
<i>Ulvibacter</i> sp. OTU#774258	PA		6	
Flavobacteriaceae sp. OTU#659486	PA		4	
<i>Alteromonas</i> sp. OTU#565946	PA			8
Rhodobacteraceae (OTU#569286)	PA			4
<i>Synechococcus</i> (OTU#831789)	PA			4
Erythrobacteraceae (OTU#582344)	PA			4

Table S5. Detailed list of indicator species for various sample classifying categories including size, season, depths, and location on the shelf. Each test is a separate tab. (Excel file)

Table S6. Summary of indicator species for size fraction, season, and depth

Taxon (OTU)	fraction	season	depth
<i>Fluviicola</i> (Cryomorphaceae) (OTU#228555)	PA		
OM60 (OTU#630330)	PA		
Pelagibacteraceae (OTU#637092)	FL		
Rhodobacteraceae (OTU#534690)		Fall	
Rhodobacteraceae (OTU#574650)		Fall	
<i>Synechococcus</i> (OTU#831789)		Fall	
<i>Synechococcus</i> (OTU#404788)		Fall	
<i>Flavobacterium</i> sp. (OTU#689465)		spring	
<i>Ulvibacter</i> sp. (OTU#774258)		spring	
Cryomorphaceae sp. (OTU#666579)		Spring	
Rhodobacteraceae (OTU#272142)		Spring	
Rhodobacteraceae (OTU#645011)		Spring	
Thiohalorhabdals (OTU#833015)			deep
Flavobacteriaceae sp. (OTU#636896)			Surface
Alphaproteobacteria sp. (OTU 335943)			Surface
Rhodobacteraceae sp. (OTU#804483)			Surface
<i>Synechococcus</i> sp. (OTU#404788)			Surface

Table S7. Welch's T-tests comparing differences between environmental parameters of on shelf and off shelf samples. Tests only include stations above 100 m depth. Variables that are significantly different between on and off shelf samples are marked in bold.

Variable	On shelf mean $\pm$ SD	Off shelf mean $\pm$ SD	<i>p</i> value
Temperature	<b>6.04 <math>\pm</math> 6.65</b>	<b>15.63 <math>\pm</math> 5.67</b>	<b>1 e<sup>-12</sup></b>
Salinity	<b>31.42 <math>\pm</math> 0.77</b>	<b>34.73 <math>\pm</math> 1.08</b>	<b>2 e<sup>-16</sup></b>
Oxygen	<b>6.97 <math>\pm</math> 1.28</b>	<b>5.34 <math>\pm</math> 0.91</b>	<b>2 e<sup>-11</sup></b>
Chlorophyll	<b>2.71 <math>\pm</math> 3.84</b>	<b>0.65 <math>\pm</math> 0.75</b>	<b>0.0003</b>
Ammonia	0.84 $\pm$ 0.51	0.98 $\pm$ 1.45	0.5
Nitrite	0.067 $\pm$ 0.06	0.098 $\pm$ 0.11	0.07
Nitrate	2.65 $\pm$ 3.56	3.46 $\pm$ 3.63	0.2
Phosphate	<b>0.53 <math>\pm</math> 0.27</b>	<b>0.31 <math>\pm</math> 0.24</b>	<b>3 e<sup>-5</sup></b>
Silicate	2.54 $\pm$ 2.87	2.01 $\pm$ 1.42	0.2

Table S8. List and presence (+) and absence (blank) of the dominant taxa and their associated size fraction (FL for free living and PA particle associated) in the Spring and Fall, on-shelf and off-shelf regions

Taxa	Fraction	Spring		Fall	
		on	off	on	off
<i>Pelagibacter</i> (OTU637092)	FL	+	+	+	+
<i>Alteromonas</i> (OTU565946)	PA	+	+	+	+
Rhodobacteriaceae (OTU569286)	FL	+	+	+	+
<i>Polaribacter</i> (OTU28929)		+			
Alteromonadales (OTU535135)		+			
<i>Octadecabacter</i> (OTU272142)		+			
Rhodobacteriaceae (OTU645011)		+			
Colwelliaceae (OTU583907)		+			
<i>Ulvibacter</i> (OTU774258)	PA	+	+		
Rhodobacteriaceae (OTU785501)		+	+		
<i>Octadecabacter</i> (OTU804483)		+	+	+	
<i>Octadecabacter</i> (OTU804449)		+	+	+	
Oceanospirillales (OTU1712364)		+	+	+	
Rhodobacteriaceae (OTU714708)		+	+	+	
<i>Pseudoalteromonas</i> (OTU827726)	FL	+	+		+
<i>Alteromonas</i> (OTU580254)			+	+	+
Pelagibacteriaceae (OTU307744)	FL		+	+	+
Pelagibacteriaceae (OTUC)	FL		+	+	
SAR86 (OTU564740)			+		
Pelagibacteriaceae (OTU320187)	FL		+		+
Pelagibacteriaceae (OTU556042)	FL			+	+
Pelagibacteriaceae (OTU352844)	FL			+	
<i>Synechococcus</i> (OTU404788)				+	
<i>Synechococcus</i> (OTU831789)				+	
Rhodobacteraceae (OTU534690)*				+	
Erythrobacteraceae (OTU582344)					+
<i>Prochlorococcus</i> (OTU227663)	FL				+
<i>Pelagibacter</i> (OTU343006)	FL				+
<i>Methylobacterium</i> (OTU542475)					+



Table S9. ANOSIM test results (9999 permutations) determining significance of seasonality, size fraction, and depth on community structure (Bray-Curtis similarity) for all samples from 2014.

<b>Grouping</b>	<b>ANOSIM statistic R</b>	<b><i>p</i></b>
<b>Season</b>	0.4655	0.0001
<b>Size</b>	0.3732	0.0001
<b>Depth</b>	0.2142	0.0001