

# **Identifying biological sources and indicators of surfactants in the sea surface microlayer and subsurface waters using fluorescence and microbial community profiling**

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*The SI contains 8 supplementary tables (Tables S1 – S8), 1 supplementary figure (Figure S1) and references.*

**Table S1:** Sample time, location, and physicochemical properties for SML and SSW samples discussed in the manuscript.

Station	ISO DateTime UTC	Time of Day	Type	Latitude	Longitude	Salinity (PSU)	Surface Temp (degC)	Chlorophyll-a (ug/L)	Nitrate + Nitrite (uM)	DOC (mg/L)
Delaware Coast	2022-08-24T18:40:00Z	Afternoon	SML	38.76335	-74.7396	32.07	24.13	0.37	11.66	1.21
Delaware Coast	2022-08-24T20:30:00Z	Afternoon	SSW	38.72596	-74.7575	32.12	23.74	0.32	-0.62	1.34
Delaware Coast	2022-08-25T00:04:00Z	Evening	SML	38.71129	-74.7464	32.51	24.95	0.39	1.84	1.72
Delaware Coast	2022-08-25T01:47:00Z	Evening	SSW	38.72966	-74.7297	32.51	24.87	0.38	-1.91	2.10
Delaware Coast	2022-08-25T06:30:00Z	Night	SML	38.71385	-74.7737	32.42	24.49	0.38	0.73	1.46
Delaware Coast	2022-08-25T09:15:00Z	Night	SSW	38.71822	-74.7483	32.42	24.53	0.36	-1.73	
Delaware Coast	2022-08-25T17:00:00Z	Afternoon	SML	38.7135	-74.7619	32.52	23.30	0.38	-0.14	1.33
Delaware Coast	2022-08-25T18:20:00Z	Afternoon	SSW	38.71481	-74.7529	32.52	22.98	0.35	-0.53	1.28
Delaware Coast	2022-08-25T22:37:00Z	Evening	SML	38.71229	-74.7681	32.51	25.34	0.36	0.68	1.23
Delaware Coast	2022-08-25T23:37:00Z	Evening	SSW	38.71471	-74.7536	32.49	25.25	0.37	-1.26	1.18
Delaware Coast	2022-08-26T06:30:00Z	Night	SML	38.71139	-74.7591	32.48	24.75	0.34	1.66	1.43
Delaware Coast	2022-08-26T09:20:00Z	Night	SSW	38.72378	-74.744	32.50	24.80	0.32	-1.32	1.19
Continental Slope	2022-08-30T06:30:00Z	Night	SML	37.8325	-73.7317	32.88	26.59	0.35	-0.53	2.02
Continental Slope	2022-08-30T09:15:00Z	Night	SSW	37.82713	-73.7362	32.87	26.60	0.36	-0.80	1.23
Continental Slope	2022-08-30T19:11:00Z	Afternoon	SSW	37.82996	-73.7353	33.60	27.37	0.37	0.19	1.18
Virginia Coast	2022-08-31T09:15:00Z	Night	SSW	37.79982	-75.4351	32.49	26.13	1.51	0.46	1.51
Virginia Coast	2022-08-31T14:00:00Z	Morning	SML	37.82082	-75.4247	32.55	23.76	3.46	-0.06	1.65
Virginia Coast	2022-08-31T15:10:00Z	Morning	SSW	37.8214	-75.4205	32.55	25.31	4.11	-1.79	1.35
Continental Slope	2022-09-01T06:39:00Z	Night	SML	37.83049	-73.7284	33.35	26.05	0.15	0.51	1.27
Continental Slope	2022-09-01T09:10:00Z	Night	SSW	37.82215	-73.7317	33.28	26.02	0.16	-0.86	1.07
Continental Slope	2022-09-01T17:00:00Z	Afternoon	SML	37.83049	-73.7284	33.21	26.39	0.22	0.45	1.44
Continental Slope	2022-09-01T18:10:00Z	Afternoon	SSW	37.82662	-73.7175	33.28	26.38	0.22	-1.16	1.14
Continental Slope	2022-09-01T22:34:00Z	Evening	SML	37.82333	-73.7192	33.18	26.31	0.19	0.11	1.36
Continental Slope	2022-09-02T00:21:00Z	Evening	SSW	37.80909	-73.6985	33.16	26.16	0.21	-0.70	1.09
Continental Slope	2022-09-02T06:34:00Z	Night	SML	37.83185	-73.7205	33.15	26.13	0.22	1.19	1.03
Continental Slope	2022-09-02T08:49:00Z	Night	SSW	37.82324	-73.7274	33.08	25.99	0.23	-1.37	1.06
Delaware Coast	2022-11-10T14:15:00Z	Morning	SML	38.71299	-74.7591	33.03	16.77	4.50	2.07	0.82

Delaware Coast	2022-11- 10T16:12:00Z	Morning	SSW	38.71055	-74.7499	33.03	16.96	3.62	-2.49	0.98
Delaware Coast	2022-11- 10T18:09:00Z	Afternoon	SML	38.71264	-74.7549	32.99	17.15	3.33	4.70	1.14
Delaware Coast	2022-11- 10T20:02:00Z	Afternoon	SSW	38.7146	-74.7494	32.96	20.72	2.60	-1.58	1.04
Delaware Coast	2022-11- 10T23:40:00Z	Evening	SML	38.71288	-74.733	32.68	21.02	2.03	15.64	1.36
Delaware Coast	2022-11- 11T01:20:00Z	Evening	SSW	38.71829	-74.7516	32.91	17.33	1.97	-1.94	1.14
Delaware Coast	2022-11- 11T06:35:00Z	Night	SML	38.71068	-74.7409	33.04	17.06	1.73	0.78	1.12
Delaware Coast	2022-11- 11T09:16:00Z	Night	SSW	38.71714	-74.753	33.02	16.67	2.16	-1.90	1.02

**Table S2:** OpenFluor match summary of FDOM components identified by PARAFAC analysis

<b>Component</b>	<b>Identity</b>	<b>Ex/Em (nm)</b>	<b>Matched Dataset</b>	<b>Matched Component</b>	<b>Similarity TCC ex·em</b>	<b>Reference</b>
C1	Tryptophan-like	276/339	DOMflour	C2	0.9864	(Lu et al., 2022)
			Mihae_Amundsen_ANA08B	C2	0.9822	(Jeon et al., 2021)
			GoMaine	C5	0.9689	(Cawley et al., 2012a)
C2	Marine humic-like	250/395	SharkBay	C1	0.9854	(Cawley et al., 2012b)
			Arctic Seawater	C2	0.9825	(Chen et al., 2018)
			Gao_AF4	C1	0.9787	(Gao and Guéguen, 2017)
C3	Terrestrial humic-like	259/464	M156 M160	C1	0.9937	(Devresse et al., 2023)
			Dainard_Bering2013	C1	0.9911	(Dainard and Guéguen, 2013)
			JapanSea	C1	0.9869	(Tanaka et al., 2014)
C4	Tyrosine-like	276/309	LiverpoolBay	C6	0.967	(Yamashita et al., 2011)
			PARIX	C7	0.9667	(Philibert et al., 2022)
			Korean porewaters	C3	0.9549	(Chen et al., 2017)

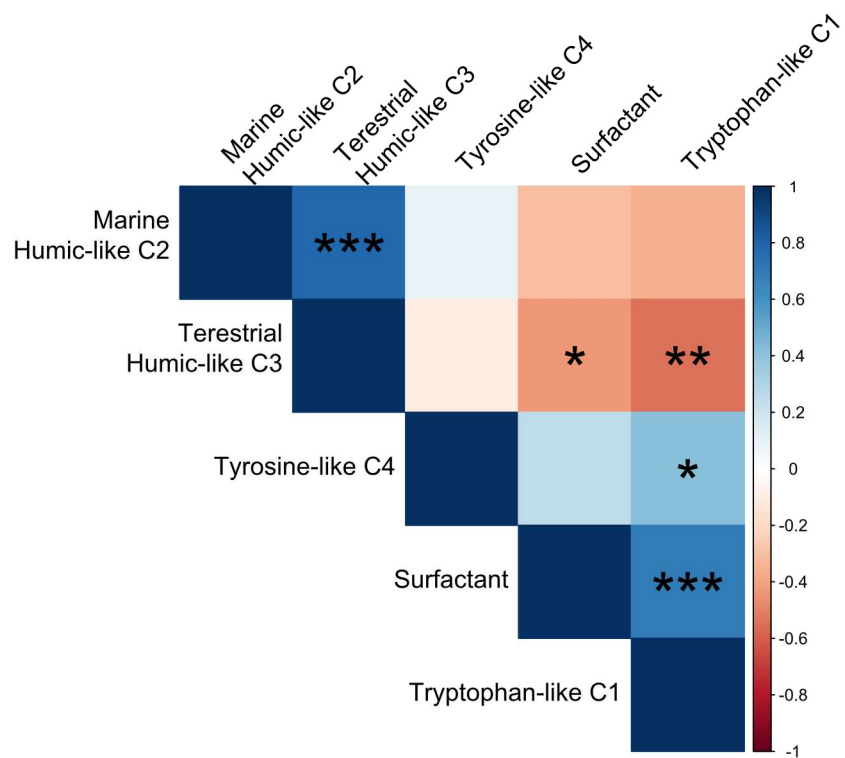


Figure S1: Pearson correlation coefficients (color bar) showing relationships among DOM variables. (\*\*\*) =  $P < 0.001$ , (\*\*) =  $P < 0.01$ , (\*) =  $P < 0.05$ )

**Table S3:** Bacterial lineages significantly associated with either the SML or SSW as determined by indicator species analysis.

Phylum	Genus	ASV	Mean Abundance (%) <sup>*</sup>	Association Strength (r.g) <sup>+</sup>	P value
<b>SML Associated Taxa</b>					
Actinomycetota	Candidatus_Actinomarina	ASV010	2.509	0.35	0.015
Pseudomonadota	SAR86_clade	ASV008	2.110	0.26	0.02
Pseudomonadota	SAR86_clade	ASV013	2.058	0.30	0.006
Pseudomonadota	SAR86_clade	ASV014	1.379	0.16	0.046
Pseudomonadota	Candidatus_Puniceispirillum	ASV031	0.917	0.36	0.001
Pseudomonadota	SAR116_clade	ASV020	0.897	0.21	0.013
Pseudomonadota	AEGEAN-169_marine_group	ASV030	0.831	0.28	0.032
Pseudomonadota	Paracoccaceae	ASV026	0.745	0.21	0.047
Pseudomonadota	AEGEAN-169_marine_group	ASV040	0.744	0.34	0.013
Pseudomonadota	SAR86_clade	ASV044	0.582	0.31	0.006
Pseudomonadota	SAR116_clade	ASV105	0.337	0.31	0.014
Pseudomonadota	KI89A_clade	ASV063	0.289	0.26	0.015
Pseudomonadota	SAR116_clade	ASV069	0.271	0.19	0.005
Dadabacteria	CSP1-2_insertae_sedis_family	ASV077	0.270	0.32	0.002
Pseudomonadota	SAR86_clade	ASV070	0.200	0.22	0.014
Pseudomonadota	Parvibaculaceae	ASV113	0.199	0.22	0.004
Pseudomonadota	AEGEAN-169_marine_group	ASV051	0.197	0.22	0.023
Pseudomonadota	SAR116_clade	ASV126	0.184	0.24	0.031
Pseudomonadota	Gammaproteobacteria	ASV200	0.112	0.33	0.005
Pseudomonadota	AEGEAN-169_marine_group	ASV139	0.101	0.35	0.001
Bacteroidota	NS5_marine_group	ASV340	0.073	0.32	0.014
Pseudomonadota	Thalassobaculales	ASV266	0.066	0.26	0.022
Pseudomonadota	SAR86_clade	ASV297	0.059	0.27	0.004
Bacteroidota	Marinoscillum	ASV331	0.056	0.21	0.043
Pseudomonadota	Thalassobaculales	ASV339	0.051	0.20	0.049
Pseudomonadota	KI89A_clade	ASV415	0.040	0.19	0.041
Pseudomonadota	SAR116_clade	ASV373	0.030	0.26	0.025
Pseudomonadota	Magnetospiraceae	ASV523	0.029	0.47	0.008
Pseudomonadota	AEGEAN-169_marine_group	ASV604	0.020	0.33	0.016
Pseudomonadota	OM182_clade	ASV591	0.020	0.23	0.048
<b>SSW Associated Taxa</b>					
Pseudomonadota	Caulobacter	ASV009	4.802	0.39	0.001
Bacteroidota	NS5_marine_group	ASV017	1.216	0.11	0.042
Pseudomonadota	Alteromonas	ASV038	0.980	0.29	0.049
Pseudomonadota	Cupriavidus	ASV059	0.824	0.44	0.001
Pseudomonadota	Comamonadaceae	ASV079	0.473	0.30	0.01

Bacteroidota	Mesoflavibacter	ASV130	0.334	0.29	0.002
Bacteroidota	Cryomorpaceae	ASV067	0.282	0.19	0.027
Pseudomonadota	Thalassospira	ASV207	0.212	0.39	0.002
Pseudomonadota	Thalassolituus	ASV290	0.207	0.31	0.014
Bacteroidota	Fluviicola	ASV072	0.183	0.23	0.006
Pseudomonadota	Aquabacterium	ASV215	0.146	0.23	0.01
Bacteroidota	Leeuwenhoekella	ASV397	0.096	0.20	0.015
Bacteroidota	Pseudofulvibacter	ASV180	0.076	0.17	0.028
Bacillota	Bacillaceae	ASV458	0.067	0.20	0.04
Actinomycetota	ML602J-51	ASV376	0.066	0.30	0.04
Pseudomonadota	Aliiroseovarius	ASV472	0.061	0.29	0.007
Pseudomonadota	Novosphingobium	ASV499	0.057	0.34	0.003
Pseudomonadota	Gammaproteobacteria	ASV076	0.052	0.30	0.01
Pseudomonadota	Pseudoalteromonas	ASV551	0.048	0.29	0.012
Bacillota	Niallia	ASV554	0.046	0.27	0.008
Pseudomonadota	Thalassospira	ASV091	0.043	0.30	0.008
Cyanobacteriota	Synechococcus_CC9902	ASV521	0.042	0.24	0.014
Pseudomonadota	Azospira	ASV571	0.040	0.31	0.006
Pseudomonadota	Candidatus_Odyssella	ASV564	0.039	0.30	0.012
Pseudomonadota	Comamonadaceae	ASV650	0.037	0.30	0.016
Cyanobacteriota	Synechococcus_CC9902	ASV505	0.035	0.24	0.038
Pseudomonadota	Cupriavidus	ASV634	0.033	0.28	0.047
Pseudomonadota	Vibrio	ASV367	0.030	0.30	0.035
Cyanobacteriota	Synechococcus_CC9902	ASV507	0.029	0.19	0.049
Bacteroidota	NS7_marine_group	ASV454	0.029	0.18	0.043
Pseudomonadota	Ponticaulis	ASV489	0.028	0.57	0.001
Pseudomonadota	Sphingomonadaceae	ASV127	0.026	0.24	0.016
Bacteroidota	Aquibacter	ASV449	0.024	0.24	0.01
Pseudomonadota	Sphingobium	ASV337	0.023	0.30	0.005
Cyanobacteriota	Cyanobiaceae	ASV633	0.023	0.17	0.018
Pseudomonadota	Sphingobium	ASV1016	0.022	0.28	0.014
Bacteroidota	Flavobacteriaceae	ASV375	0.020	0.39	0.007
Pseudomonadota	Marinobacter	ASV1208	0.020	0.32	0.014
Bacteroidota	NS9_marine_group	ASV382	0.019	0.27	0.024
Pseudomonadota	Zoogloea	ASV977	0.019	0.30	0.012
Bacteroidota	Winogradskyella	ASV741	0.019	0.33	0.005
Bacteroidota	Fluviicola	ASV610	0.018	0.38	0.027
Bacteroidota	Flavobacteriaceae	ASV626	0.017	0.16	0.031
Bacteroidota	Fluviicola	ASV615	0.017	0.27	0.034
Bacillota	Neobacillus	ASV802	0.017	0.28	0.005
Pseudomonadota	Saccharospirillaceae	ASV1171	0.017	0.46	0.001

Bacteroidota	Nonlabens	ASV1119	0.017	0.24	0.019
Planctomycetota	Mariniblastus	ASV475	0.016	0.27	0.011
Bacteroidota	Cyclobacteriaceae	ASV664	0.016	0.21	0.034
Cyanobacteriota	Cyanobium_PCC-6307	ASV613	0.016	0.40	0.006
Bacteroidota	Muricauda	ASV807	0.015	0.35	0.007
Pseudomonadota	Beijerinckiaceae	ASV775	0.015	0.27	0.045
Bacteroidota	Saprosiraceae	ASV1013	0.015	0.29	0.026
Pseudomonadota	Brevundimonas	ASV548	0.013	0.25	0.028
Pseudomonadota	Thalassospira	ASV287	0.013	0.43	0.002
Pseudomonadota	Nitrosomonadaceae	ASV1097	0.013	0.38	0.008
Cyanobacteriota	Cyanobiaceae	ASV827	0.013	0.30	0.026
Pseudomonadota	Alphaproteobacteria	ASV665	0.012	0.30	0.028
Bacteroidota	Aureispira	ASV1139	0.012	0.22	0.009
Cyanobacteriota	Synechococcus_CC9902	ASV1055	0.012	0.27	0.02
Campylobacterota	Arcobacter	ASV1513	0.012	0.30	0.043
Cyanobacteriota	Synechococcus_CC9902	ASV1832	0.011	0.27	0.049
Pseudomonadota	Pseudomonas	ASV1392	0.011	0.26	0.033
Pseudomonadota	Gammaproteobacteria	ASV643	0.011	0.32	0.025
Bacteroidota	Crocinitomix	ASV940	0.010	0.46	0.008
Pseudomonadota	B2M28	ASV908	0.010	0.31	0.043
Cyanobacteriota	Synechococcus_CC9902	ASV1180	0.010	0.33	0.006
Bacteroidota	Cryomorphaeae	ASV1045	0.010	0.21	0.046
Pseudomonadota	Paracoccaceae	ASV1048	0.010	0.33	0.01
Bacteroidota	Marinoscillum	ASV1603	0.009	0.27	0.037
Pseudomonadota	Alphaproteobacteria	ASV1265	0.009	0.29	0.048
Pseudomonadota	Haliaceae	ASV805	0.008	0.31	0.018
Pseudomonadota	Thalassolituus	ASV1855	0.008	0.33	0.046
Bacteroidota	NS9_marine_group	ASV1168	0.007	0.26	0.043
Bacteroidota	NS5_marine_group	ASV353	0.007	0.26	0.047
Pseudomonadota	Hellea	ASV666	0.007	0.32	0.018
Bacteroidota	Sphingobacteriales	ASV2254	0.006	0.35	0.026
Cyanobacteriota	Cyanobiaceae	ASV1653	0.006	0.32	0.009
Bacteroidota	NS9_marine_group	ASV1209	0.006	0.33	0.033
Bacteroidota	NS9_marine_group	ASV970	0.006	0.25	0.032
Pseudomonadota	Filomicrobium	ASV1263	0.006	0.41	0.007
Verrucomicrobiota	Rubritalea	ASV2649	0.005	0.29	0.048
Actinomycetota	Candidatus_Actinomarina	ASV2086	0.005	0.33	0.014
Pseudomonadota	Methylobacterium	ASV391	0.005	0.33	0.022
Pseudomonadota	Sphingomonas	ASV2242	0.005	0.32	0.032
Bdellovibrionota	OM27_clade	ASV1111	0.005	0.28	0.045
Pseudomonadota	Kordiimonas	ASV3126	0.005	0.33	0.029

Bacteroidota	NS5_marine_group	ASV1629	0.005	0.31	0.013
SAR324_clade(Marine_group_B)	SAR324_clade_insertae_sedis	ASV2310	0.005	0.31	0.017
Bacteria_unclassified	Bacteria	ASV1749	0.005	0.24	0.032
Pseudomonadota	Spongiibacteraceae	ASV1136	0.004	0.34	0.036
Actinomycetota	Sva0996_marine_group	ASV1669	0.004	0.35	0.024
Bacteria_unclassified	Bacteria	ASV2129	0.004	0.32	0.041
Cyanobacteriota	Atelocyanobacterium_(UCYN-A)	ASV1496	0.004	0.30	0.025
Bacteroidota	Crocinitomix	ASV2618	0.004	0.37	0.007
Pseudomonadota	Candidatus_Hepatincola_insertae_sedis_family	ASV1734	0.004	0.35	0.011
Pseudomonadota	Seongchinamella	ASV1232	0.004	0.34	0.04
Bacteroidota	Roseivirga	ASV1895	0.004	0.38	0.014
Pseudomonadota	Alcanivorax	ASV159	0.003	0.36	0.02
Bdellovibrionota	OM27_clade	ASV1403	0.003	0.26	0.048
Bacteroidota	NS9_marine_group	ASV2083	0.003	0.34	0.006
Thermodesulfobacteriota	PB19	ASV5289	0.003	0.29	0.042
Pseudomonadota	SAR86_clade	ASV3099	0.003	0.29	0.043
Pseudomonadota	Alphaproteobacteria	ASV1651	0.002	0.31	0.037
Cyanobacteriota	Synechococcus_CC9902	ASV5683	0.002	0.28	0.039
Planctomycetota	Pirellulaceae	ASV7113	0.002	0.27	0.043
Cyanobacteriota	Cyanobiaceae	ASV4206	0.002	0.25	0.047

\*Mean relative abundance (%) of each ASV calculated within its associated sample type (SML or SSW).

†Group-equalized point-biserial correlation coefficient (r.g) showing association strength between each ASV and sample type.

**Table S4:** Protist lineages significantly associated with either the SML or SSW as determined by indicator species analysis.

Division	Genus	ASV	Mean Abundance (%) <sup>*</sup>	Association Strength (r.g) <sup>+</sup>	P value
<b>SML Associated Taxa</b>					
Chlorophyta	Ostreococcus	ASV001	20.533	0.257	0.011
Chlorophyta	Ostreococcus	ASV034	2.824	0.303	0.023
Alveolata	Dino-Group-II-Clade-1_X	ASV183	0.914	0.348	0.017
Rhizaria	Cryomonadida_XX	ASV488	0.554	0.266	0.028
Stramenopiles	Phytophthora	ASV1099	0.220	0.303	0.009
Alveolata	Dino-Group-II	ASV1402	0.185	0.303	0.039
Alveolata	Dino-Group-V_XX	ASV184	0.162	0.356	0.005
Alveolata	Dino-Group-II-Clade-22_X	ASV850	0.144	0.310	0.040
Alveolata	Prorocentrum	ASV231	0.087	0.343	0.005
Alveolata	Dino-Group-II-Clade-12_X	ASV1232	0.083	0.355	0.015
Alveolata	Dino-Group-II-Clade-1_X	ASV200	0.074	0.271	0.035
Stramenopiles	MOCH-4_XXX	ASV760	0.073	0.291	0.007
Alveolata	Dino-Group-III_XX	ASV324	0.067	0.308	0.006
Chlorophyta	Microthamniales_X	ASV2889	0.060	0.289	0.028
Alveolata	Gyrodinium	ASV671	0.059	0.353	0.020
Alveolata	Dinophyceae	ASV294	0.056	0.331	0.007
Alveolata	Dino-Group-II-Clade-1_X	ASV306	0.055	0.337	0.003
Alveolata	Dino-Group-II-Clade-12_X	ASV399	0.054	0.256	0.043
Alveolata	Dino-Group-II-Clade-3_X	ASV825	0.053	0.322	0.015
Alveolata	Dino-Group-II	ASV841	0.043	0.391	0.006
Stramenopiles	MOCH-2_XXX	ASV1906	0.031	0.365	0.013
Chlorophyta	Pterosperma	ASV669	0.026	0.375	0.009
Alveolata	Dinophyceae	ASV511	0.023	0.360	0.009
<b>SSW Associated Taxa</b>					
Alveolata	Gyrodinium	ASV003	8.716	0.265	0.037
Alveolata	Gyrodinium	ASV021	2.616	0.425	0.003
Alveolata	Strombidiidae_X	ASV162	1.157	0.411	0.001
Alveolata	Laboea	ASV043	0.647	0.376	0.001
Alveolata	Gonyaulax	ASV197	0.511	0.316	0.029
Alveolata	Gyrodinium	ASV046	0.495	0.379	0.016
Alveolata	Strombidiidae_X	ASV073	0.309	0.357	0.039
Alveolata	Strombidiidae_X	ASV247	0.254	0.447	0.002
Alveolata	Spirotrichea	ASV265	0.251	0.413	0.010
Alveolata	Oligotrichida_XX	ASV373	0.211	0.431	0.003
Alveolata	Pelagodinium	ASV120	0.210	0.331	0.027
Alveolata	Dino-Group-II-Clade-5_X	ASV093	0.201	0.224	0.034

Alveolata	Dinophyceae	ASV030	0.164	0.318	0.039
Alveolata	Strombidiidae_X	ASV300	0.162	0.359	0.008
Alveolata	Strombidiidae	ASV302	0.120	0.371	0.023
Alveolata	Dino-Group-II-Clade-23_X	ASV643	0.117	0.353	0.032
Alveolata	Pseudotonia	ASV147	0.115	0.331	0.021
Alveolata	Dino-Group-II-Clade-5_X	ASV477	0.106	0.277	0.033
Alveolata	Spirotrichea	ASV475	0.106	0.355	0.040
Alveolata	Dinophyceae	ASV346	0.096	0.343	0.005
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV524	0.062	0.365	0.034

\*Mean relative abundance (%) of each ASV calculated within its associated sample type (SML or SSW).

+Group-equalized point-biserial correlation coefficient (r.g) indicating the strength of association between each ASV and sample type.

**Table S5:** Top 30 most abundant bacterial lineages significantly associated with each sampling station as determined by indicator species analysis.

Phylum	Genus	ASV	Mean Abundance (%)*	Association Strength (r.g) <sup>+</sup>	P value	Stations
Cyanobacteriota	Prochlorococcus_MIT9313	ASV003	3.177	0.949	0.001	Continental Slope
Cyanobacteriota	Cyanobium_PCC-6307	ASV006	2.846	0.805	0.001	Continental Slope
SAR324_clade(Marine_group_B)	SAR324_clade_insertae_sedis	ASV024	0.856	0.789	0.001	Continental Slope
Pseudomonadota	Paracoccaceae	ASV032	0.483	0.897	0.001	Continental Slope
Pseudomonadota	SAR116_clade	ASV042	0.402	0.913	0.001	Continental Slope
Cyanobacteriota	Synechococcus_CC9902	ASV016	0.379	0.867	0.001	Continental Slope
Pseudomonadota	Clade_Ib	ASV007	0.345	0.760	0.001	Continental Slope
Pseudomonadota	SAR116_clade	ASV036	0.261	0.770	0.001	Continental Slope
Pseudomonadota	SAR86_clade	ASV043	0.251	0.898	0.001	Continental Slope
Pseudomonadota	KI89A_clade	ASV063	0.227	0.721	0.001	Continental Slope
Pseudomonadota	SAR116_clade	ASV069	0.213	0.897	0.001	Continental Slope
Pseudomonadota	Clade_III	ASV094	0.198	0.798	0.001	Continental Slope
Dadabacteria	CSP1-2_insertae_sedis_family	ASV077	0.194	0.769	0.001	Continental Slope
Bacteroidota	NS5_marine_group	ASV050	0.158	0.777	0.001	Continental Slope
Pseudomonadota	AEGEAN-169_marine_group	ASV051	0.152	0.821	0.001	Continental Slope
Pseudomonadota	Parvibaculaceae	ASV113	0.150	0.870	0.001	Continental Slope
Pseudomonadota	SAR86_clade	ASV070	0.149	0.853	0.001	Continental Slope
Pseudomonadota	MWH-UniP1_aquatic_group	ASV078	0.135	0.676	0.001	Continental Slope
Pseudomonadota	SAR116_clade	ASV151	0.131	0.640	0.002	Continental Slope
Pseudomonadota	OM60(NOR5)_clade	ASV144	0.117	0.808	0.001	Continental Slope
Planctomycetota	OM190	ASV218	0.111	0.850	0.001	Continental Slope
Pseudomonadota	Pseudohongiella	ASV132	0.103	0.796	0.001	Continental Slope
Pseudomonadota	S25-593	ASV135	0.095	0.818	0.001	Continental Slope
Verrucomicrobiota	DEV007	ASV161	0.094	0.790	0.001	Continental Slope
Cyanobacteriota	Cyanobiaceae	ASV087	0.093	0.631	0.005	Continental Slope
Cyanobacteriota	Cyanobiaceae	ASV096	0.080	0.596	0.007	Continental Slope
Cyanobacteriota	Prochlorococcus_MIT9313	ASV173	0.076	0.901	0.001	Continental Slope

Pseudomonadota	Asciidiaceihabitans	ASV217	0.071	0.779	0.001	Continental Slope
Pseudomonadota	SAR86_clade	ASV157	0.067	0.770	0.001	Continental Slope
Verrucomicrobiota	MB11C04_marine_group	ASV190	0.067	0.913	0.001	Continental Slope
Pseudomonadota	Clade_Ia	ASV002	10.159	0.798	0.001	Delaware Coast Fall
Pseudomonadota	SAR86_clade	ASV008	1.778	0.712	0.001	Delaware Coast Fall
Actinomycetota	Candidatus_Actinomarina	ASV011	1.421	0.931	0.001	Delaware Coast Fall
Pseudomonadota	SAR86_clade	ASV014	1.191	0.886	0.001	Delaware Coast Fall
Bacteroidota	NS5_marine_group	ASV017	1.048	0.883	0.001	Delaware Coast Fall
Bacteroidota	NS5_marine_group	ASV025	0.671	0.995	0.001	Delaware Coast Fall
Pseudomonadota	Candidatus_Puniceispirillum	ASV037	0.347	0.840	0.001	Delaware Coast Fall
Pseudomonadota	SAR86_clade	ASV048	0.280	0.923	0.001	Delaware Coast Fall
Pseudomonadota	SUP05_cluster	ASV058	0.252	0.942	0.001	Delaware Coast Fall
Cyanobacteriota	Synechococcus_CC9902	ASV015	0.248	0.821	0.001	Delaware Coast Fall
Pseudomonadota	Ectothiorhodospiraceae	ASV055	0.237	0.683	0.001	Delaware Coast Fall
Planctomycetota	Pirellulaceae	ASV073	0.193	0.527	0.008	Delaware Coast Fall
Bacteroidota	NS5_marine_group	ASV081	0.187	0.950	0.001	Delaware Coast Fall
Pseudomonadota	OM43_clade	ASV088	0.186	0.827	0.001	Delaware Coast Fall
Bacteroidota	Fluviicola	ASV072	0.138	0.860	0.001	Delaware Coast Fall
Pseudomonadota	Amylibacter	ASV082	0.117	0.775	0.001	Delaware Coast Fall
Pseudomonadota	Thalassolituus	ASV290	0.106	0.551	0.012	Delaware Coast Fall
Pseudomonadota	Pseudohongiella	ASV146	0.106	0.979	0.001	Delaware Coast Fall
Pseudomonadota	Ectothiorhodospiraceae	ASV198	0.104	0.981	0.001	Delaware Coast Fall
Pseudomonadota	Luminiphilus	ASV117	0.093	0.648	0.001	Delaware Coast Fall
Actinomycetota	Candidatus_Actinomarina	ASV175	0.092	0.802	0.001	Delaware Coast Fall
Bacteroidota	NS7_marine_group	ASV208	0.087	0.883	0.001	Delaware Coast Fall
Pseudomonadota	AEGEAN-169_marine_group	ASV139	0.078	0.746	0.001	Delaware Coast Fall
Pseudomonadota	AEGEAN-169_marine_group	ASV100	0.077	0.689	0.001	Delaware Coast Fall
Bacteroidota	NS9_marine_group	ASV166	0.075	0.964	0.001	Delaware Coast Fall
Bacteroidota	NS9_marine_group	ASV203	0.073	0.861	0.001	Delaware Coast Fall
Balneolota	Balneola	ASV124	0.071	0.478	0.034	Delaware Coast Fall

Bacteroidota	Cryomorphaceae	ASV153	0.069	0.848	0.001	Delaware Coast Fall
Pseudomonadota	OM60(NOR5)_clade	ASV179	0.068	0.959	0.001	Delaware Coast Fall
Pseudomonadota	Porticoccus	ASV224	0.065	0.932	0.001	Delaware Coast Fall
Pseudomonadota	Comamonadaceae	ASV079	0.244	0.423	0.039	Delaware Coast Summer
Verrucomicrobiota	Roseibacillus	ASV085	0.237	0.802	0.001	Delaware Coast Summer
Pseudomonadota	Clade_III	ASV071	0.236	0.776	0.001	Delaware Coast Summer
Pseudomonadota	SAR116_clade	ASV105	0.215	0.621	0.003	Delaware Coast Summer
Pseudomonadota	OM60(NOR5)_clade	ASV107	0.183	0.680	0.001	Delaware Coast Summer
Pseudomonadota	Litorivicinus	ASV099	0.173	0.700	0.001	Delaware Coast Summer
Pseudomonadota	SAR92_clade	ASV152	0.150	0.460	0.032	Delaware Coast Summer
Bacteroidota	NS5_marine_group	ASV123	0.147	0.763	0.001	Delaware Coast Summer
Bacteroidota	NS5_marine_group	ASV150	0.147	0.550	0.015	Delaware Coast Summer
Bacteroidota	NS4_marine_group	ASV086	0.132	0.664	0.003	Delaware Coast Summer
Planctomycetota	Mariniblastus	ASV118	0.127	0.698	0.001	Delaware Coast Summer
Bacteroidota	NS5_marine_group	ASV133	0.122	0.876	0.001	Delaware Coast Summer
Pseudomonadota	Clade_III	ASV147	0.106	0.678	0.002	Delaware Coast Summer
Bacillota	Acholeplasma	ASV206	0.078	0.807	0.001	Delaware Coast Summer
Bacteroidota	NS5_marine_group	ASV324	0.067	0.701	0.002	Delaware Coast Summer
Cyanobacteriota	Cyanobiaceae	ASV216	0.061	0.739	0.001	Delaware Coast Summer
Pseudomonadota	OM60(NOR5)_clade	ASV332	0.060	0.758	0.002	Delaware Coast Summer
Cyanobacteriota	Synechococcus_CC9902	ASV283	0.056	0.708	0.001	Delaware Coast Summer
Pseudomonadota	PS1_clade	ASV374	0.040	0.773	0.001	Delaware Coast Summer
Bacteroidota	NS9_marine_group	ASV423	0.032	0.708	0.001	Delaware Coast Summer
Bacteroidota	NS5_marine_group	ASV413	0.031	0.705	0.003	Delaware Coast Summer
Pseudomonadota	Novosphingobium	ASV499	0.030	0.469	0.021	Delaware Coast Summer
Pseudomonadota	Vibrionaceae	ASV461	0.029	0.531	0.008	Delaware Coast Summer
Pseudomonadota	Pseudoalteromonas	ASV551	0.026	0.498	0.014	Delaware Coast Summer
Pseudomonadota	SAR116_clade	ASV387	0.026	0.728	0.001	Delaware Coast Summer
Bacteroidota	NS4_marine_group	ASV425	0.023	0.649	0.001	Delaware Coast Summer
Bacteroidota	Fluviicola	ASV480	0.022	0.789	0.001	Delaware Coast Summer

Pseudomonadota	Azospira	ASV571	0.021	0.456	0.036	Delaware Coast Summer
Verrucomicrobiota	Roseibacillus	ASV427	0.020	0.548	0.006	Delaware Coast Summer
Pseudomonadota	Candidatus_Puniceispirillum	ASV594	0.020	0.676	0.002	Delaware Coast Summer
Cyanobacteriota	Cyanobium_PCC-6307	ASV019	1.081	0.891	0.001	Virginia Coast
Pseudomonadota	HIMB11	ASV023	0.898	0.862	0.001	Virginia Coast
Actinomycetota	PeM15	ASV068	0.426	0.535	0.025	Virginia Coast
Cyanobacteriota	Synechococcus_CC9902	ASV056	0.418	0.763	0.001	Virginia Coast
Actinomycetota	Microbacteriaceae	ASV092	0.287	0.698	0.004	Virginia Coast
Cyanobacteriota	Synechococcus_CC9902	ASV074	0.272	0.817	0.001	Virginia Coast
Bacteroidota	Mesoflavibacter	ASV130	0.172	0.480	0.034	Virginia Coast
Cyanobacteriota	Cyanobium_PCC-6307	ASV164	0.150	0.937	0.001	Virginia Coast
Bacteroidota	Formosa	ASV075	0.135	0.834	0.001	Virginia Coast
Cyanobacteriota	Cyanobium_PCC-6307	ASV176	0.134	0.934	0.001	Virginia Coast
Actinomycetota	Sva0996_marine_group	ASV285	0.091	0.748	0.001	Virginia Coast
Pseudomonadota	AEGEAN-169_marine_group	ASV231	0.086	0.881	0.001	Virginia Coast
Bacteroidota	NS9_marine_group	ASV160	0.081	0.721	0.001	Virginia Coast
Actinomycetota	Ilumatobacteraceae	ASV299	0.080	0.712	0.001	Virginia Coast
Bacteroidota	Cryomorphaceae	ASV174	0.076	0.827	0.001	Virginia Coast
Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV223	0.076	0.951	0.001	Virginia Coast
Pseudomonadota	OM60(NOR5)_clade	ASV298	0.070	0.704	0.001	Virginia Coast
Actinomycetota	Gaiellales	ASV369	0.053	0.580	0.014	Virginia Coast
Actinomycetota	Candidatus_Aquiluna	ASV336	0.052	0.849	0.001	Virginia Coast
Pseudomonadota	Alphaproteobacteria	ASV322	0.050	0.867	0.001	Virginia Coast
Planctomycetota	Mariniblastus	ASV366	0.048	0.628	0.009	Virginia Coast
Planctomycetota	Rubripirellula	ASV394	0.044	0.554	0.009	Virginia Coast
Bacteroidota	NS5_marine_group	ASV393	0.042	0.982	0.001	Virginia Coast
Pseudomonadota	Haliaceae	ASV482	0.039	0.798	0.001	Virginia Coast
Planctomycetota	Pirellulaceae	ASV484	0.035	0.675	0.001	Virginia Coast
Actinomycetota	Actinobacteria	ASV512	0.028	0.674	0.001	Virginia Coast
Bacteroidota	Flavobacteriaceae	ASV421	0.027	0.864	0.001	Virginia Coast

Pseudomonadota	Vibrio	ASV363	0.027	0.697	0.010	Virginia Coast
Cyanobacteriota	Synechococcus_CC9902	ASV521	0.026	0.872	0.001	Virginia Coast
Pseudomonadota	Halieaceae	ASV559	0.024	0.577	0.014	Virginia Coast

\*Mean relative abundance (%) of each ASV calculated across all samples.

+Group-equalized point-biserial correlation coefficient (r.g) indicating the strength of association between each ASV and sample stations.

**Table S6:** Top 30 most abundant protist lineages significantly associated with each sampling station as determined by indicator species analysis.

Division	Genus	ASV	Mean Abundance (%) <sup>*</sup>	Association Strength (r.g) <sup>+</sup>	P value	Stations
Alveolata	Dino-Group-II-Clade-6_X	ASV012	3.036	0.889	0.001	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV025	2.699	0.969	0.001	Continental Slope
Alveolata	Dino-Group-I-Clade-1_X	ASV032	1.032	0.810	0.002	Continental Slope
Chlorophyta	Chloropicon	ASV045	0.821	0.908	0.001	Continental Slope
Alveolata	Dino-Group-II-Clade-6_X	ASV039	0.814	0.867	0.001	Continental Slope
Alveolata	Strombidiidae_X	ASV162	0.596	0.526	0.020	Continental Slope
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV058	0.574	0.835	0.001	Continental Slope
Alveolata	Dino-Group-I-Clade-1_X	ASV056	0.556	0.537	0.026	Continental Slope
Alveolata	Dinophyceae	ASV064	0.554	0.648	0.006	Continental Slope
Chlorophyta	Prasino-Clade-9_XXX	ASV136	0.530	0.858	0.003	Continental Slope
Alveolata	Dino-Group-II-Clade-3_X	ASV131	0.509	0.799	0.001	Continental Slope
Alveolata	Dino-Group-I-Clade-1_X	ASV072	0.482	0.747	0.002	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV067	0.463	0.834	0.001	Continental Slope
Alveolata	Dino-Group-I-Clade-1_X	ASV050	0.397	0.764	0.002	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV157	0.344	0.572	0.019	Continental Slope
Alveolata	Dino-Group-III_XX	ASV100	0.343	0.804	0.002	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV180	0.318	0.578	0.021	Continental Slope
Alveolata	Dino-Group-II-Clade-17_X	ASV140	0.305	0.885	0.001	Continental Slope
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV066	0.266	0.633	0.009	Continental Slope
Alveolata	Euduboscquella	ASV353	0.254	0.718	0.003	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV173	0.250	0.644	0.006	Continental Slope
Alveolata	Dino-Group-III_XX	ASV047	0.237	0.733	0.001	Continental Slope
Alveolata	Dino-Group-II-Clade-13_X	ASV218	0.221	0.693	0.001	Continental Slope
Alveolata	Dino-Group-II-Clade-16_X	ASV075	0.219	0.525	0.020	Continental Slope
Alveolata	Dino-Group-II-Clade-8_X	ASV226	0.197	0.744	0.004	Continental Slope
Alveolata	Dino-Group-II-Clade-13_X	ASV251	0.176	0.498	0.037	Continental Slope
Alveolata	Dino-Group-II-Clade-20_X	ASV181	0.163	0.511	0.024	Continental Slope

Stramenopiles	MAST-1D	ASV152	0.161	0.492	0.033	Continental Slope
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV219	0.152	0.574	0.029	Continental Slope
Alveolata	Dino-Group-I-Clade-5_X	ASV342	0.149	0.579	0.021	Continental Slope
Chlorophyta	Ostreococcus	ASV001	16.699	0.769	0.001	Delaware Coast Fall
Alveolata	Dinophyceae	ASV011	0.907	0.970	0.001	Delaware Coast Fall
Rhizaria	Acanthometra	ASV018	0.778	0.882	0.001	Delaware Coast Fall
Stramenopiles	Minidiscus	ASV017	0.596	0.976	0.001	Delaware Coast Fall
Picozoa	Picomonas	ASV027	0.590	0.924	0.001	Delaware Coast Fall
Cryptophyta	Plagioselmis	ASV016	0.503	0.664	0.008	Delaware Coast Fall
Chlorophyta	Micromonas	ASV023	0.472	0.928	0.001	Delaware Coast Fall
Chlorophyta	Bathycoccus	ASV008	0.460	0.784	0.002	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-14_X	ASV038	0.284	0.966	0.001	Delaware Coast Fall
Stramenopiles	Pelagomonadales_clade_B1	ASV041	0.277	0.852	0.001	Delaware Coast Fall
Alveolata	Prorocentrum	ASV029	0.274	0.882	0.001	Delaware Coast Fall
Stramenopiles	Aureococcus	ASV042	0.253	0.904	0.001	Delaware Coast Fall
Alveolata	Dinophyceae	ASV080	0.240	0.562	0.023	Delaware Coast Fall
Chlorophyta	Micromonas	ASV036	0.220	0.797	0.005	Delaware Coast Fall
Stramenopiles	MAST-3E	ASV090	0.206	0.603	0.016	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-5_X	ASV093	0.123	0.785	0.002	Delaware Coast Fall
Stramenopiles	Aplanochytrium	ASV150	0.086	0.666	0.005	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-14_X	ASV095	0.082	0.855	0.001	Delaware Coast Fall
Chlorophyta	Chloroparvula	ASV060	0.082	0.765	0.002	Delaware Coast Fall
Stramenopiles	MAST-3E	ASV282	0.080	0.551	0.024	Delaware Coast Fall
Chlorophyta	Ostreococcus	ASV314	0.077	0.636	0.013	Delaware Coast Fall
Chlorophyta	Pseudoscourfieldia	ASV084	0.074	0.797	0.001	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-1_X	ASV106	0.067	0.703	0.009	Delaware Coast Fall
Cryptophyta	Teleaulax	ASV091	0.065	0.741	0.003	Delaware Coast Fall
Alveolata	Karlodinium	ASV165	0.064	0.720	0.005	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-17_X	ASV213	0.056	0.908	0.001	Delaware Coast Fall
Alveolata	Prorocentrum	ASV274	0.055	0.591	0.018	Delaware Coast Fall

Stramenopiles	MAST-3E	ASV368	0.052	0.709	0.004	Delaware Coast Fall
Alveolata	Dino-Group-II-Clade-1_X	ASV200	0.047	0.606	0.019	Delaware Coast Fall
Stramenopiles	Aureococcus	ASV441	0.045	0.693	0.004	Delaware Coast Fall
Chlorophyta	Ostreococcus	ASV034	1.861	0.714	0.004	Delaware Coast Summer
Stramenopiles	MAST-9D	ASV094	1.672	0.894	0.001	Delaware Coast Summer
Alveolata	Gyrodinium	ASV063	0.771	0.617	0.010	Delaware Coast Summer
Alveolata	Dinophyceae	ASV116	0.628	0.646	0.008	Delaware Coast Summer
Alveolata	Gonyaulax	ASV148	0.592	0.627	0.006	Delaware Coast Summer
Alveolata	Dadayiella	ASV392	0.475	0.866	0.001	Delaware Coast Summer
Stramenopiles	MAST-4B	ASV141	0.306	0.527	0.025	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-3_X	ASV235	0.274	0.530	0.034	Delaware Coast Summer
Alveolata	Gonyaulax	ASV197	0.272	0.570	0.013	Delaware Coast Summer
Alveolata	Strombidiidae	ASV523	0.226	0.665	0.002	Delaware Coast Summer
Alveolata	Dinophyceae	ASV503	0.204	0.598	0.019	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV221	0.165	0.467	0.049	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV132	0.154	0.591	0.011	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-7_X	ASV547	0.150	0.563	0.025	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-20_X	ASV087	0.114	0.522	0.035	Delaware Coast Summer
Alveolata	Dino-Group-II	ASV1832	0.097	0.560	0.022	Delaware Coast Summer
Alveolata	Dino-Group-II	ASV1402	0.094	0.474	0.043	Delaware Coast Summer
Alveolata	Gonyaulax	ASV822	0.091	0.620	0.013	Delaware Coast Summer
Alveolata	Dinophyceae	ASV1729	0.077	0.491	0.025	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-22_X	ASV850	0.074	0.489	0.031	Delaware Coast Summer
Picozoa	Picozoa_subdivision_2_XXXX	ASV605	0.065	0.543	0.033	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-12_X	ASV1935	0.048	0.613	0.009	Delaware Coast Summer
Alveolata	Euduboscquella	ASV2219	0.040	0.527	0.025	Delaware Coast Summer
Alveolata	Dino-Group-III_XX	ASV433	0.035	0.544	0.028	Delaware Coast Summer
Alveolata	Dinophyceae	ASV1151	0.035	0.494	0.048	Delaware Coast Summer
Alveolata	Dino-Group-II-Clade-3_X	ASV1930	0.032	0.573	0.025	Delaware Coast Summer
Alveolata	Dino-Group-I-Clade-3_X	ASV469	0.032	0.524	0.023	Delaware Coast Summer

Alveolata	NASSO_1	ASV301	0.031	0.530	0.025	Delaware Coast Summer
Stramenopile s	MAST-7B	ASV1293	0.028	0.631	0.010	Delaware Coast Summer
Stramenopile s	MAST-3I	ASV1840	0.028	0.475	0.044	Delaware Coast Summer
Chlorophyta	Chlorellales_X	ASV117	0.296	0.850	0.001	Virginia Coast
Alveolata	Dinophyceae	ASV040	0.262	0.889	0.001	Virginia Coast
Chlorophyta	Picochlorum	ASV101	0.262	0.837	0.001	Virginia Coast
Stramenopile s	Leptocylindrus	ASV010	0.239	0.814	0.001	Virginia Coast
Stramenopile s	Guinardia	ASV065	0.227	0.838	0.001	Virginia Coast
Stramenopile s	Thalassiosiraceae	ASV127	0.212	0.975	0.001	Virginia Coast
Stramenopile s	Cyclotella	ASV121	0.195	0.901	0.001	Virginia Coast
Alveolata	Dino-Group-II-Clade-6_X	ASV160	0.182	0.739	0.002	Virginia Coast
Stramenopile s	Minutocellus	ASV161	0.162	0.919	0.001	Virginia Coast
Alveolata	Dino-Group-II-Clade-6_X	ASV055	0.156	0.986	0.001	Virginia Coast
Alveolata	Strombidiidae_X	ASV097	0.132	0.779	0.001	Virginia Coast
Alveolata	Dino-Group-II-Clade-6_X	ASV113	0.119	0.674	0.001	Virginia Coast
Stramenopile s	Leptocylindrus	ASV307	0.108	0.604	0.016	Virginia Coast
Alveolata	Pelagostrobilidium	ASV246	0.104	0.893	0.001	Virginia Coast
Stramenopile s	Cyclotella	ASV234	0.102	0.946	0.001	Virginia Coast
Chlorophyta	Crustomastigaceae	ASV476	0.082	0.715	0.001	Virginia Coast
Stramenopile s	Skeletonema	ASV259	0.080	0.842	0.001	Virginia Coast
Alveolata	Dino-Group-I-Clade-4_X	ASV198	0.078	0.916	0.001	Virginia Coast
Alveolata	Dino-Group-II-Clade-13_X	ASV295	0.075	0.961	0.001	Virginia Coast
Chlorophyta	Picochlorum	ASV516	0.069	0.585	0.020	Virginia Coast
Rhizaria	Ebria	ASV267	0.063	0.964	0.001	Virginia Coast
Alveolata	Strombidiidae	ASV302	0.062	0.666	0.010	Virginia Coast
Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV430	0.062	0.845	0.001	Virginia Coast
Alveolata	Pseudotontonia	ASV147	0.059	0.516	0.043	Virginia Coast
Alveolata	Alexandrium	ASV646	0.056	0.540	0.018	Virginia Coast
Alveolata	Spirotrichea	ASV475	0.054	0.617	0.016	Virginia Coast
Chlorophyta	Picochlorum	ASV768	0.053	0.474	0.041	Virginia Coast

Rhodophyta	Porphyridiales_X	ASV519	0.052	0.898	0.001	Virginia Coast
Chlorophyta	Micromonas	ASV286	0.048	0.794	0.005	Virginia Coast
Cryptophyta	Baffinella	ASV545	0.046	0.590	0.014	Virginia Coast

\*Mean relative abundance (%) of each ASV calculated across all samples.

+Group-equalized point-biserial correlation coefficient (r.g) indicating the strength of association between each ASV and sample stations.

**Table S7:** Bacterial ASVs significantly correlating with DOM variables.

DOM Variable	Phylum	Genus	ASV	Pearson Correlation Coefficient	P Value
Tryptophan-like C1	Pseudomonadota	Clade_Ia	ASV002	0.384	0.028
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV008	0.476	0.005
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV011	0.373	0.032
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV014	0.424	0.014
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV025	0.445	0.009
Tryptophan-like C1	Pseudomonadota	AEGEAN-169_marine_group	ASV030	0.453	0.008
Tryptophan-like C1	Pseudomonadota	SAR116_clade_unclassified	ASV035	0.387	0.026
Tryptophan-like C1	Pseudomonadota	Candidatus_Puniceispirillum	ASV037	0.395	0.023
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV048	0.557	0.001
Tryptophan-like C1	Pseudomonadota	Ectothiorhodospiraceae	ASV055	0.386	0.026
Tryptophan-like C1	Pseudomonadota	SUP05_cluster	ASV058	0.471	0.006
Tryptophan-like C1	Pseudomonadota	OCS116_clade	ASV062	0.598	0.000
Tryptophan-like C1	Pseudomonadota	OM43_clade	ASV088	0.530	0.002
Tryptophan-like C1	Pseudomonadota	AEGEAN-169_marine_group	ASV100	0.573	0.000
Tryptophan-like C1	Pseudomonadota	Luminiphilus	ASV117	0.346	0.048
Tryptophan-like C1	Pseudomonadota	AEGEAN-169_marine_group	ASV139	0.470	0.006
Tryptophan-like C1	Pseudomonadota	Pseudohongiella	ASV146	0.491	0.004
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV149	0.491	0.004
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV166	0.392	0.024
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV167	0.531	0.001
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV171	0.412	0.017
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV175	0.363	0.038
Tryptophan-like C1	Pseudomonadota	OM60(NOR5)_clade	ASV179	0.379	0.030
Tryptophan-like C1	Pseudomonadota	OM75_clade	ASV183	0.458	0.007
Tryptophan-like C1	Pseudomonadota	Ectothiorhodospiraceae	ASV198	0.448	0.009
Tryptophan-like C1	Pseudomonadota	UBA10353_marine_group	ASV214	0.388	0.026
Tryptophan-like C1	Pseudomonadota	Porticoccus	ASV224	0.543	0.001

Tryptophan-like C1	Pseudomonadota	Pseudohongiella	ASV227	0.494	0.003
Tryptophan-like C1	Bacillota	Staphylococcus	ASV245	0.392	0.024
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV246	0.459	0.007
Tryptophan-like C1	Pseudomonadota	Clade_IV	ASV251	0.384	0.027
Tryptophan-like C1	Marinimicrobia (SAR406_clade)	Marinimicrobia (SAR406_clade)	ASV277	0.428	0.013
Tryptophan-like C1	Pseudomonadota	IS-44	ASV278	0.477	0.005
Tryptophan-like C1	Pseudomonadota	Leucotrichaceae	ASV294	0.423	0.014
Tryptophan-like C1	Pseudomonadota	Woeseia	ASV302	0.543	0.001
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV305	0.486	0.004
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV310	0.431	0.012
Tryptophan-like C1	Bacteroidota	Cryomorphaceae	ASV316	0.429	0.013
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV321	0.447	0.009
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV360	0.405	0.019
Tryptophan-like C1	Pseudomonadota	OM182_clade	ASV396	0.443	0.010
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV399	0.391	0.024
Tryptophan-like C1	Pseudomonadota	OM43_clade	ASV408	0.404	0.020
Tryptophan-like C1	Pseudomonadota	KI89A_clade	ASV415	0.550	0.001
Tryptophan-like C1	Pseudomonadota	KI89A_clade	ASV424	0.387	0.026
Tryptophan-like C1	Pseudomonadota	Coxiella	ASV430	0.514	0.002
Tryptophan-like C1	Pseudomonadota	Defluviococcales	ASV452	0.346	0.048
Tryptophan-like C1	Pseudomonadota	Candidatus_Punicispirillum	ASV453	0.451	0.008
Tryptophan-like C1	Pseudomonadota	Haliaceae_unclassified	ASV467	0.463	0.007
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV468	0.358	0.041
Tryptophan-like C1	Pseudomonadota	Defluviococcales	ASV495	0.436	0.011
Tryptophan-like C1	Pseudomonadota	Marivibrio	ASV500	0.534	0.001
Tryptophan-like C1	Verrucomicrobiota	MB11C04_marine_group	ASV516	0.350	0.046
Tryptophan-like C1	Pseudomonadota	Clade_IV	ASV517	0.410	0.018
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV558	0.358	0.041
Tryptophan-like C1	Pseudomonadota	OM182_clade	ASV585	0.418	0.016
Tryptophan-like C1	Verrucomicrobiota	MB11C04_marine_group	ASV595	0.502	0.003

Tryptophan-like C1	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV621	0.382	0.028
Tryptophan-like C1	Pseudomonadota	Litorivicinus	ASV639	0.375	0.031
Tryptophan-like C1	Bdellovibrionota	Bacteriovoracaceae	ASV702	0.410	0.018
Tryptophan-like C1	Pseudomonadota	Magnetospiraceae	ASV715	0.360	0.039
Tryptophan-like C1	Bacteroidota	Crocinitomix	ASV783	0.418	0.015
Tryptophan-like C1	Bacteroidota	Bacteroidia_unclassified	ASV788	0.467	0.006
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV800	0.513	0.002
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV841	0.390	0.025
Tryptophan-like C1	Pseudomonadota	Puniceispirillales	ASV844	0.349	0.047
Tryptophan-like C1	Pseudomonadota	Pseudoalteromonas	ASV915	0.457	0.007
Tryptophan-like C1	Bacteroidota	Aureisphaera	ASV924	0.378	0.030
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV967	0.386	0.026
Tryptophan-like C1	Pseudomonadota	Marinomonas	ASV981	0.443	0.010
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV993	0.487	0.004
Tryptophan-like C1	Pseudomonadota	Gammaproteobacteria_unclassified	ASV1022	0.429	0.013
Tryptophan-like C1	Pseudomonadota	Defluviicoccales	ASV1065	0.391	0.024
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV1192	0.358	0.041
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV1410	0.391	0.025
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV001	-0.430	0.013
Tryptophan-like C1	Pseudomonadota	Caulobacter	ASV009	-0.394	0.023
Tryptophan-like C1	Pseudomonadota	Halomonas	ASV034	-0.386	0.027
Tryptophan-like C1	Bacteroidota	NS2b_marine_group	ASV052	-0.497	0.003
Tryptophan-like C1	Pseudomonadota	Litorivicinus	ASV099	-0.345	0.049
Tryptophan-like C1	Pseudomonadota	Alcanivorax	ASV159	-0.533	0.001
Tryptophan-like C1	Cyanobacteriota	Cyanobiaceae_unclassified	ASV216	-0.385	0.027
Tryptophan-like C1	Pseudomonadota	Pseudoalteromonas	ASV222	-0.406	0.019
Tryptophan-like C1	Pseudomonadota	OM43_clade	ASV289	-0.381	0.029
Tryptophan-like C1	Bacteroidota	NS7_marine_group	ASV303	-0.445	0.009
Tryptophan-like C1	Bacteroidota	NS4_marine_group	ASV317	-0.373	0.033
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV356	-0.387	0.026

Tryptophan-like C1	Pseudomonadota	Methylobacterium	ASV391	-0.387	0.026
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV469	-0.412	0.017
Tryptophan-like C1	Pseudomonadota	Ponticaulis	ASV489	-0.360	0.040
Tryptophan-like C1	Pseudomonadota	Pseudoalteromonas	ASV551	-0.347	0.048
Tryptophan-like C1	Verrucomicrobiota	Puniceicoccaceae_unclassified	ASV567	-0.414	0.017
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV587	-0.350	0.046
Tryptophan-like C1	Pseudomonadota	Alphaproteobacteria_unclassified	ASV714	-0.395	0.023
Tryptophan-like C1	Bacteroidota	Fluviicola	ASV731	-0.354	0.043
Tryptophan-like C1	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV798	-0.418	0.016
Tryptophan-like C1	Pseudomonadota	Marinobacter	ASV808	-0.356	0.042
Tryptophan-like C1	Pseudomonadota	Methylophagaceae_unclassified	ASV885	-0.373	0.033
Tryptophan-like C1	Bacteroidota	Saprospiraceae	ASV895	-0.372	0.033
Tryptophan-like C1	Pseudomonadota	OM60(NOR5)_clade	ASV939	-0.382	0.028
Tryptophan-like C1	Pseudomonadota	Alteromonadaceae_unclassified	ASV960	-0.365	0.037
Tryptophan-like C1	Pseudomonadota	mle1-7	ASV987	-0.371	0.034
Tryptophan-like C1	Pseudomonadota	Sphingopyxis	ASV1007	-0.474	0.005
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV1048	-0.353	0.044
Tryptophan-like C1	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV1096	-0.411	0.018
Tryptophan-like C1	Pseudomonadota	Nitrosomonadaceae_unclassified	ASV1097	-0.378	0.030
Tryptophan-like C1	Bdellovibrionota	OM27_clade	ASV1111	-0.419	0.015
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV1153	-0.396	0.023
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV1180	-0.349	0.046
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV1194	-0.408	0.018
Tryptophan-like C1	Bacteria_unclassified	Bacteria_unclassified	ASV1352	-0.420	0.015
Tryptophan-like C1	Bacteroidota	Pseudotenacibaculum	ASV1365	-0.427	0.013
Tryptophan-like C1	Pseudomonadota	Coxiella	ASV1394	-0.444	0.010
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV1397	-0.360	0.039
Tryptophan-like C1	Bdellovibrionota	OM27_clade	ASV1403	-0.424	0.014
Tryptophan-like C1	Pseudomonadota	Coxiella	ASV1416	-0.372	0.033
Tryptophan-like C1	Pseudomonadota	Clade_II	ASV1457	-0.383	0.028

Tryptophan-like C1	Pseudomonadota	IS-44	ASV1504	-0.347	0.048
Tryptophan-like C1	Bacteroidota	NS4_marine_group	ASV1508	-0.357	0.042
Tryptophan-like C1	Pseudomonadota	Sphingopyxis	ASV1530	-0.368	0.035
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV1554	-0.371	0.033
Tryptophan-like C1	Pseudomonadota	Porticoccus	ASV1581	-0.351	0.045
Tryptophan-like C1	Pseudomonadota	Magnetospiraceae	ASV1594	-0.362	0.038
Tryptophan-like C1	Bacteroidota	NS5_marine_group	ASV1629	-0.383	0.028
Tryptophan-like C1	Pseudomonadota	Alphaproteobacteria	ASV1651	-0.367	0.036
Tryptophan-like C1	Pseudomonadota	SAR116_clade	ASV1661	-0.352	0.045
Tryptophan-like C1	Bacteroidota	Crocinitomicaceae_unclassified	ASV1710	-0.360	0.040
Tryptophan-like C1	Pseudomonadota	Candidatus_Hepatincola_insertae_sedis_family	ASV1734	-0.426	0.013
Tryptophan-like C1	Pseudomonadota	Magnetospiraceae	ASV1746	-0.384	0.027
Tryptophan-like C1	Bacteria_unclassified	Bacteria_unclassified	ASV1749	-0.442	0.010
Tryptophan-like C1	Thermodesulfobacteriota	PB19	ASV1751	-0.420	0.015
Tryptophan-like C1	Bacteroidota	Flavobacteriaceae_unclassified	ASV1768	-0.397	0.022
Tryptophan-like C1	Pseudomonadota	Unknown_Family	ASV1814	-0.428	0.013
Tryptophan-like C1	Bacteroidota	Flavobacteriaceae	ASV1835	-0.382	0.028
Tryptophan-like C1	Pseudomonadota	Thalassolituus	ASV1855	-0.465	0.006
Tryptophan-like C1	Actinomycetota	Candidatus_Actinomarina	ASV1874	-0.393	0.024
Tryptophan-like C1	Bacteroidota	Roseivirga	ASV1895	-0.485	0.004
Tryptophan-like C1	Bdellovibrionota	Peredibacter	ASV1897	-0.459	0.007
Tryptophan-like C1	Bdellovibrionota	OM27_clade	ASV1938	-0.362	0.039
Tryptophan-like C1	Actinomycetota	Acidimicrobiia_unclassified	ASV1941	-0.449	0.009
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV2052	-0.381	0.029
Tryptophan-like C1	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV2057	-0.351	0.046
Tryptophan-like C1	Bacteroidota	NS11-12_marine_group	ASV2059	-0.353	0.044
Tryptophan-like C1	Myxococcota	Nannocystaceae	ASV2080	-0.396	0.023
Tryptophan-like C1	Verrucomicrobiota	Roseibacillus	ASV2082	-0.402	0.020
Tryptophan-like C1	Bacteroidota	NS9_marine_group	ASV2083	-0.438	0.011
Tryptophan-like C1	Pseudomonadota	Gammaproteobacteria_unclassified	ASV2115	-0.351	0.045

Tryptophan-like C1	Pseudomonadota	SAR116_clade_unclassified	ASV2126	-0.345	0.049
Tryptophan-like C1	Bacteria_unclassified	Bacteria_unclassified	ASV2129	-0.418	0.016
Tryptophan-like C1	Verrucomicrobiota	SCGC_AAA164-E04	ASV2152	-0.361	0.039
Tryptophan-like C1	Pseudomonadota	Psychrosphaera	ASV2153	-0.376	0.031
Tryptophan-like C1	Pseudomonadota	Defluviicoccales	ASV2187	-0.364	0.037
Tryptophan-like C1	Pseudomonadota	Sphingomonas	ASV2242	-0.387	0.026
Tryptophan-like C1	Pseudomonadota	Clade_I_unclassified	ASV2255	-0.365	0.037
Tryptophan-like C1	Thermodesulfobacteriota	Bradymonadales	ASV2334	-0.372	0.033
Tryptophan-like C1	Verrucomicrobiota	SCGC_AAA164-E04	ASV2502	-0.376	0.031
Tryptophan-like C1	Actinomycetota	Actinomarinales	ASV2528	-0.356	0.042
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV2533	-0.374	0.032
Tryptophan-like C1	Pseudomonadota	Gammaproteobacteria_unclassified	ASV2568	-0.355	0.042
Tryptophan-like C1	Bacteroidota	Crocinitomix	ASV2618	-0.360	0.040
Tryptophan-like C1	Bacteria_unclassified	Bacteria_unclassified	ASV2637	-0.365	0.037
Tryptophan-like C1	Pseudomonadota	UBA10353_marine_group	ASV2658	-0.393	0.024
Tryptophan-like C1	Verrucomicrobiota	Lentimonas	ASV2775	-0.403	0.020
Tryptophan-like C1	Pseudomonadota	Saccharospirillaceae_unclassified	ASV2824	-0.471	0.006
Tryptophan-like C1	Pseudomonadota	Gammaproteobacteria_unclassified	ASV2934	-0.352	0.045
Tryptophan-like C1	Bacteroidota	Dokdonia	ASV2984	-0.488	0.004
Tryptophan-like C1	Pseudomonadota	Thalassotalea	ASV3009	-0.354	0.044
Tryptophan-like C1	Pseudomonadota	Psychrobacter	ASV3077	-0.350	0.046
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV3099	-0.353	0.044
Tryptophan-like C1	Myxococcota	Nannocystaceae	ASV3151	-0.352	0.045
Tryptophan-like C1	Bacteroidota	Vicingus	ASV3430	-0.359	0.040
Tryptophan-like C1	Pseudomonadota	Azospira	ASV3567	-0.381	0.029
Tryptophan-like C1	Patescibacteria	Candidatus_Peregrinibacteria	ASV3591	-0.369	0.035
Tryptophan-like C1	Bacillota	Bacillaceae_unclassified	ASV3629	-0.362	0.038
Tryptophan-like C1	Fusobacteriota	Propionigenium	ASV3668	-0.372	0.033
Tryptophan-like C1	Pseudomonadota	SAR86_clade	ASV3733	-0.352	0.044
Tryptophan-like C1	Cyanobacteriota	Cyanobiaceae_unclassified	ASV4206	-0.400	0.021

Tryptophan-like C1	Pseudomonadota	Gammaproteobacteria	ASV4264	-0.408	0.018
Tryptophan-like C1	Pseudomonadota	Alphaproteobacteria_unclassified	ASV4474	-0.385	0.027
Tryptophan-like C1	Thermodesulfobacteriota	PB19	ASV5289	-0.354	0.044
Tryptophan-like C1	Cyanobacteriota	Synechococcus_CC9902	ASV5683	-0.435	0.011
Tryptophan-like C1	Pseudomonadota	Paracoccaceae_unclassified	ASV7166	-0.410	0.018
Tryptophan-like C1	Pseudomonadota	Sphingobium	ASV8000	-0.392	0.024
Humic-like C2	Bacteroidota	NS7_marine_group	ASV208	0.349	0.047
Humic-like C2	Pseudomonadota	Thalassospira	ASV287	0.560	0.001
Humic-like C2	Pseudomonadota	Thalassolituus	ASV290	0.446	0.009
Humic-like C2	Bacteroidota	NS9_marine_group	ASV308	0.456	0.008
Humic-like C2	Pseudomonadota	Sphingobium	ASV337	0.382	0.028
Humic-like C2	Bacteroidota	Flavobacteriaceae_unclassified	ASV375	0.345	0.050
Humic-like C2	Bacteroidota	Aquibacter	ASV449	0.470	0.006
Humic-like C2	Bacteroidota	NS7_marine_group	ASV454	0.399	0.022
Humic-like C2	Planctomycetota	Mariniblastus	ASV475	0.483	0.004
Humic-like C2	Pseudomonadota	Ponticaulis	ASV489	0.348	0.047
Humic-like C2	Bdellovibrionota	Oligoflexaceae	ASV539	0.355	0.043
Humic-like C2	Bacteroidota	Fluviicola	ASV610	0.345	0.049
Humic-like C2	Bacteroidota	Cyclobacteriaceae	ASV664	0.467	0.006
Humic-like C2	Pseudomonadota	Woeseia	ASV670	0.347	0.048
Humic-like C2	Bacteroidota	Pseudofulvibacter	ASV752	0.360	0.040
Humic-like C2	Bacteroidota	Cryomorphaceae	ASV832	0.431	0.012
Humic-like C2	Bacteria_unclassified	Bacteria_unclassified	ASV858	0.354	0.043
Humic-like C2	Thermodesulfobacteriota	PB19	ASV1039	0.407	0.019
Humic-like C2	Planctomycetota	CL500-3	ASV1151	0.405	0.019
Humic-like C2	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV1164	0.430	0.012
Humic-like C2	Pseudomonadota	Marinobacter	ASV1208	0.387	0.026
Humic-like C2	Campylobacterota	Sulfurovum	ASV1506	0.439	0.011
Humic-like C2	Bacteroidota	Sphingobacteriales_unclassified	ASV2254	0.386	0.027
Humic-like C2	Cyanobacteriota	Synechococcus_CC9902	ASV167	-0.364	0.038
Humic-like C2	Bacillota	Staphylococcus	ASV245	-0.498	0.003
Humic-like C3	Cyanobacteriota	Trichodesmium_IMS101	ASV090	0.382	0.028
Humic-like C3	Pseudomonadota	Thalassospira	ASV207	0.356	0.042
Humic-like C3	Pseudomonadota	Thalassospira	ASV287	0.443	0.010
Humic-like C3	Pseudomonadota	Thalassolituus	ASV290	0.358	0.041
Humic-like C3	Pseudomonadota	Vibrio	ASV367	0.346	0.048
Humic-like C3	Bacteroidota	Flavobacteriaceae_unclassified	ASV375	0.365	0.037
Humic-like C3	Bacteroidota	Aquibacter	ASV449	0.351	0.045
Humic-like C3	Pseudomonadota	Ponticaulis	ASV489	0.547	0.001

Humic-like C3	Pseudomonadota	Saccharospirillaceae_unclassified	ASV1171	0.368	0.035
Humic-like C3	Pseudomonadota	Psychrosphaera	ASV2153	0.344	0.050
Humic-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV030	-0.377	0.031
Humic-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV040	-0.386	0.027
Humic-like C3	Pseudomonadota	Candidatus_Puniceispirillum	ASV209	-0.377	0.031
Humic-like C3	Bacillota	Staphylococcus	ASV245	-0.394	0.023
Humic-like C3	Pseudomonadota	Magnetospiraceae	ASV523	-0.488	0.004
Humic-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV534	-0.430	0.012
Humic-like C3	Pseudomonadota	MWH-UniP1_aquatic_group	ASV698	-0.350	0.046
Humic-like C3	Pseudomonadota	Haliaceae_unclassified	ASV751	-0.347	0.048
Humic-like C3	Pseudomonadota	SAR86_clade	ASV1410	-0.349	0.046
Tyrosine-like C3	Cyanobacteriota	Prochlorococcus_MIT9313	ASV003	0.536	0.001
Tyrosine-like C3	Pseudomonadota	Clade_II	ASV004	0.508	0.003
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV006	0.447	0.009
Tyrosine-like C3	Pseudomonadota	Clade_Ib	ASV007	0.487	0.004
Tyrosine-like C3	Actinomycetota	Candidatus_Actinomarina	ASV010	0.363	0.038
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV016	0.639	0.000
Tyrosine-like C3	SAR324_clade(Marine_group_B)	SAR324_clade_insertae_sedis	ASV024	0.410	0.018
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV026	0.611	0.000
Tyrosine-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV030	0.436	0.011
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV032	0.555	0.001
Tyrosine-like C3	Pseudomonadota	SAR116_clade_unclassified	ASV035	0.566	0.001
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV036	0.493	0.004
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV042	0.408	0.019
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV043	0.549	0.001
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV050	0.420	0.015
Tyrosine-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV051	0.355	0.042
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV054	0.458	0.007
Tyrosine-like C3	Pseudomonadota	Ectothiorhodospiraceae	ASV055	0.373	0.032
Tyrosine-like C3	Pseudomonadota	S25-593	ASV057	0.578	0.000
Tyrosine-like C3	Pseudomonadota	OCS116_clade	ASV062	0.563	0.001
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV069	0.492	0.004
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV070	0.381	0.029

Tyrosine-like C3	Pseudomonadota	MWH-UniP1_aquatic_group	ASV078	0.387	0.026
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV087	0.519	0.002
Tyrosine-like C3	Pseudomonadota	Clade_III	ASV094	0.491	0.004
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV096	0.492	0.004
Tyrosine-like C3	Pseudomonadota	Parvibaculaceae	ASV113	0.415	0.016
Tyrosine-like C3	Bacteroidota	Marinoscillum	ASV122	0.386	0.027
Tyrosine-like C3	Pseudomonadota	S25-593	ASV135	0.594	0.000
Tyrosine-like C3	Pseudomonadota	OM60(NOR5)_clade	ASV144	0.416	0.016
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV151	0.599	0.000
Tyrosine-like C3	Verrucomicrobiota	DEV007	ASV161	0.483	0.004
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV162	0.359	0.040
Tyrosine-like C3	Pseudomonadota	OM75_clade	ASV172	0.395	0.023
Tyrosine-like C3	Cyanobacteriota	Prochlorococcus_MIT9313	ASV173	0.515	0.002
Tyrosine-like C3	Bacteroidota	NS4_marine_group	ASV181	0.420	0.015
Tyrosine-like C3	Verrucomicrobiota	MB11C04_marine_group	ASV190	0.414	0.016
Tyrosine-like C3	Pseudomonadota	SAR92_clade	ASV192	0.433	0.012
Tyrosine-like C3	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV197	0.412	0.017
Tyrosine-like C3	Pseudomonadota	Gammaproteobacteria_unclassified	ASV200	0.385	0.027
Tyrosine-like C3	Bacteroidota	NS2b_marine_group	ASV201	0.498	0.003
Tyrosine-like C3	Bacteroidota	NS9_marine_group	ASV202	0.543	0.001
Tyrosine-like C3	Pseudomonadota	Candidatus_Puniceispirillum	ASV209	0.493	0.004
Tyrosine-like C3	Bacteroidota	NS2b_marine_group	ASV210	0.465	0.006
Tyrosine-like C3	Pseudomonadota	Asciidiehabitans	ASV217	0.471	0.006
Tyrosine-like C3	Planctomycetota	OM190	ASV218	0.505	0.003
Tyrosine-like C3	Bacteroidota	Formosa	ASV225	0.550	0.001
Tyrosine-like C3	Pseudomonadota	Clade_II	ASV228	0.446	0.009
Tyrosine-like C3	Bacteroidota	Fluviicola	ASV258	0.416	0.016
Tyrosine-like C3	Actinomycetota	Sva0996_marine_group	ASV259	0.365	0.036
Tyrosine-like C3	Pseudomonadota	Leucotrichaceae	ASV286	0.365	0.037
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV297	0.386	0.027

Tyrosine-like C3	Cyanobacteriota	Prochlorococcus_MIT9313	ASV300	0.508	0.003
Tyrosine-like C3	Verrucomicrobiota	R76-B128	ASV301	0.559	0.001
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV314	0.524	0.002
Tyrosine-like C3	Bacteroidota	Marinoscillum	ASV331	0.462	0.007
Tyrosine-like C3	Bacteroidota	NS4_marine_group	ASV334	0.533	0.001
Tyrosine-like C3	Pseudomonadota	Magnetospiraceae	ASV335	0.409	0.018
Tyrosine-like C3	Pseudomonadota	Thalassobaculales	ASV339	0.393	0.024
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV378	0.352	0.045
Tyrosine-like C3	Bacteroidota	NS9_marine_group	ASV382	0.430	0.012
Tyrosine-like C3	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV383	0.368	0.035
Tyrosine-like C3	Planctomycetota	Pirellulaceae	ASV392	0.522	0.002
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV406	0.358	0.041
Tyrosine-like C3	Verrucomicrobiota	MB11C04_marine_group	ASV407	0.536	0.001
Tyrosine-like C3	Cyanobacteriota	Prochlorococcus_MIT9313	ASV420	0.426	0.013
Tyrosine-like C3	Pseudomonadota	Candidatus_Punicispirillum	ASV422	0.444	0.010
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV426	0.421	0.015
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV429	0.356	0.042
Tyrosine-like C3	Cyanobacteriota	Atelocyanobacterium_(UCYN-A)	ASV479	0.525	0.002
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV481	0.369	0.035
Tyrosine-like C3	Verrucomicrobiota	R76-B128	ASV491	0.531	0.001
Tyrosine-like C3	Actinomycetota	Candidatus_Actinomarina	ASV515	0.385	0.027
Tyrosine-like C3	Pseudomonadota	Magnetospiraceae	ASV569	0.421	0.015
Tyrosine-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV604	0.421	0.015
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV623	0.431	0.012
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV632	0.397	0.022
Tyrosine-like C3	Verrucomicrobiota	Coraliomargarita	ASV647	0.426	0.014
Tyrosine-like C3	Actinomycetota	Microbacteriaceae_unclassified	ASV651	0.390	0.025
Tyrosine-like C3	Bdellovibrionota	Bacteriovoracaceae	ASV702	0.366	0.036
Tyrosine-like C3	Thermodesulfobacteriota	PB19	ASV710	0.463	0.007
Tyrosine-like C3	Cyanobacteriota	Prochlorococcus_MIT9313	ASV719	0.392	0.024

Tyrosine-like C3	Pseudomonadota	Pseudomonadales_unclassified	ASV736	0.463	0.007
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV739	0.345	0.049
Tyrosine-like C3	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV763	0.356	0.042
Tyrosine-like C3	Verrucomicrobiota	MB11C04_marine_group	ASV778	0.365	0.037
Tyrosine-like C3	Pseudomonadota	Alcanivorax	ASV818	0.377	0.031
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV861	0.531	0.001
Tyrosine-like C3	Bacteroidota	NS7_marine_group	ASV862	0.435	0.011
Tyrosine-like C3	Bacteria_unclassified	Bacteria_unclassified	ASV943	0.361	0.039
Tyrosine-like C3	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV1058	0.349	0.047
Tyrosine-like C3	Pseudomonadota	MWH-UniP1_aquatic_group	ASV1176	0.442	0.010
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV1213	0.415	0.016
Tyrosine-like C3	Myxococcota	P3OB-42	ASV1230	0.419	0.015
Tyrosine-like C3	Thermodesulfobacteriota	PB19	ASV1251	0.344	0.050
Tyrosine-like C3	Bdellovibrionota	Oligoflexaceae	ASV1277	0.435	0.011
Tyrosine-like C3	Pseudomonadota	OM60(NOR5)_clade	ASV1520	0.363	0.038
Tyrosine-like C3	Thermodesulfobacteriota	PB19	ASV1588	0.442	0.010
Tyrosine-like C3	Bdellovibrionota	OM27_clade	ASV1700	0.345	0.049
Tyrosine-like C3	Pseudomonadota	Defluviicoccales	ASV1800	0.351	0.045
Tyrosine-like C3	Bacillota	Streptococcus	ASV1875	0.363	0.038
Tyrosine-like C3	Pseudomonadota	Caulobacter	ASV009	-0.388	0.026
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV019	-0.520	0.002
Tyrosine-like C3	Pseudomonadota	HIMB11	ASV023	-0.543	0.001
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV029	-0.359	0.040
Tyrosine-like C3	Bacteroidota	NS2b_marine_group	ASV052	-0.524	0.002
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV056	-0.496	0.003
Tyrosine-like C3	Pseudomonadota	Cupriavidus	ASV059	-0.373	0.032
Tyrosine-like C3	Pseudomonadota	Planktomarina	ASV061	-0.523	0.002
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV074	-0.537	0.001
Tyrosine-like C3	Bacteroidota	Formosa	ASV075	-0.502	0.003
Tyrosine-like C3	Pseudomonadota	Comamonadaceae_unclassified	ASV079	-0.371	0.034

Tyrosine-like C3	Bacteroidota	NS4_marine_group	ASV086	-0.472	0.006
Tyrosine-like C3	Actinomycetota	Microbacteriaceae_unclassified	ASV092	-0.472	0.006
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae_unclassified	ASV142	-0.388	0.026
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV150	-0.391	0.025
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV164	-0.481	0.005
Tyrosine-like C3	Bacteroidota	Cryomorphaceae	ASV174	-0.509	0.003
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV176	-0.494	0.003
Tyrosine-like C3	Bacillota	Acholeplasma	ASV206	-0.387	0.026
Tyrosine-like C3	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV223	-0.418	0.015
Tyrosine-like C3	Pseudomonadota	AEGEAN-169_marine_group	ASV231	-0.426	0.013
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV270	-0.613	0.000
Tyrosine-like C3	Actinomycetota	Sva0996_marine_group	ASV285	-0.399	0.022
Tyrosine-like C3	Pseudomonadota	OM43_clade	ASV289	-0.418	0.015
Tyrosine-like C3	Bacteroidota	Winogradskyella	ASV292	-0.356	0.042
Tyrosine-like C3	Pseudomonadota	OM60(NOR5)_clade	ASV298	-0.570	0.001
Tyrosine-like C3	Actinomycetota	Ilumatobacteraceae_unclassified	ASV299	-0.415	0.016
Tyrosine-like C3	Pseudomonadota	Alphaproteobacteria_unclassified	ASV322	-0.452	0.008
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV324	-0.352	0.045
Tyrosine-like C3	Actinomycetota	Candidatus_Aquiluna	ASV336	-0.511	0.002
Tyrosine-like C3	Pseudomonadota	Vibrio	ASV363	-0.362	0.039
Tyrosine-like C3	Actinomycetota	Gaiellales	ASV369	-0.375	0.032
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae_unclassified	ASV375	-0.396	0.023
Tyrosine-like C3	Bacteroidota	NS11-12_marine_group	ASV380	-0.505	0.003
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV393	-0.481	0.005
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae_unclassified	ASV421	-0.410	0.018
Tyrosine-like C3	Bacteroidota	NS9_marine_group	ASV423	-0.520	0.002
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV439	-0.485	0.004
Tyrosine-like C3	Pseudomonadota	Haliaceae_unclassified	ASV482	-0.398	0.022
Tyrosine-like C3	Planctomycetota	Pirellulaceae	ASV484	-0.362	0.039
Tyrosine-like C3	Pseudomonadota	Clade_III	ASV498	-0.456	0.008

Tyrosine-like C3	Pseudomonadota	Novosphingobium	ASV499	-0.365	0.036
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV505	-0.510	0.002
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV507	-0.532	0.001
Tyrosine-like C3	Actinomycetota	Actinobacteria_unclassified	ASV512	-0.353	0.044
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV521	-0.528	0.002
Tyrosine-like C3	Pseudomonadota	Alcanivorax	ASV527	-0.491	0.004
Tyrosine-like C3	Bacteroidota	Saprospiraceae	ASV541	-0.460	0.007
Tyrosine-like C3	Pseudomonadota	Azospira	ASV571	-0.366	0.036
Tyrosine-like C3	Bacteroidota	NS9_marine_group	ASV573	-0.346	0.049
Tyrosine-like C3	Verrucomicrobiota	DEV007	ASV578	-0.416	0.016
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae_unclassified	ASV625	-0.422	0.015
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae	ASV626	-0.511	0.002
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV628	-0.457	0.008
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV633	-0.479	0.005
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV655	-0.432	0.012
Tyrosine-like C3	Bacteroidota	Flavobacteriales_unclassified	ASV658	-0.507	0.003
Tyrosine-like C3	Pseudomonadota	Hellea	ASV666	-0.512	0.002
Tyrosine-like C3	Bacteroidota	Saprospiraceae	ASV681	-0.533	0.001
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV684	-0.373	0.033
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV686	-0.456	0.008
Tyrosine-like C3	Bacteroidota	NS11-12_marine_group	ASV730	-0.433	0.012
Tyrosine-like C3	Bacteroidota	Fluviicola	ASV731	-0.389	0.025
Tyrosine-like C3	Pseudomonadota	Luminiphilus	ASV764	-0.380	0.029
Tyrosine-like C3	Planctomycetota	OM190	ASV774	-0.389	0.025
Tyrosine-like C3	Rhodothermota	Rhodothermaceae	ASV777	-0.474	0.005
Tyrosine-like C3	Pseudomonadota	Litorimicrobium	ASV784	-0.484	0.004
Tyrosine-like C3	Pseudomonadota	SUP05_cluster	ASV819	-0.458	0.007
Tyrosine-like C3	Verrucomicrobiota	DEV007	ASV823	-0.462	0.007
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV849	-0.422	0.015
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV909	-0.433	0.012

Tyrosine-like C3	Pseudomonadota	Haliaceae_unclassified	ASV917	-0.458	0.007
Tyrosine-like C3	Bacteroidota	Crocinitomix	ASV940	-0.400	0.021
Tyrosine-like C3	Bacteroidota	Cryomorphaceae	ASV968	-0.437	0.011
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV969	-0.388	0.026
Tyrosine-like C3	Pseudomonadota	mle1-7	ASV987	-0.353	0.044
Tyrosine-like C3	Rhodothermota	Rhodothermaceae	ASV999	-0.439	0.011
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV1006	-0.409	0.018
Tyrosine-like C3	Bacteroidota	Saprospiraceae	ASV1013	-0.380	0.029
Tyrosine-like C3	Planctomycetota	Pirellulaceae	ASV1021	-0.381	0.029
Tyrosine-like C3	Bacteroidota	Cryomorphaceae_unclassified	ASV1045	-0.453	0.008
Tyrosine-like C3	Verrucomicrobiota	Roseibacillus	ASV1050	-0.530	0.002
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV1055	-0.473	0.005
Tyrosine-like C3	Pseudomonadota	KI89A_clade	ASV1059	-0.436	0.011
Tyrosine-like C3	Balneolota	Balneolaceae	ASV1093	-0.399	0.021
Tyrosine-like C3	Pseudomonadota	Nitrosomonadaceae_unclassified	ASV1097	-0.462	0.007
Tyrosine-like C3	Bacteroidota	Crocinitomicaceae_unclassified	ASV1104	-0.418	0.015
Tyrosine-like C3	Bacteroidota	Aureispira	ASV1139	-0.558	0.001
Tyrosine-like C3	Bacteroidota	NS9_marine_group	ASV1168	-0.364	0.037
Tyrosine-like C3	Cyanobacteriota	Synechococcus_CC9902	ASV1180	-0.428	0.013
Tyrosine-like C3	Planctomycetota	OM190	ASV1190	-0.392	0.024
Tyrosine-like C3	Pseudomonadota	SAR86_clade	ASV1248	-0.460	0.007
Tyrosine-like C3	Bacteroidota	Saprospiraceae	ASV1294	-0.458	0.007
Tyrosine-like C3	Pseudomonadota	Hyphomonadaceae_unclassified	ASV1325	-0.429	0.013
Tyrosine-like C3	Pseudomonadota	OM60(NOR5)_clade	ASV1376	-0.394	0.023
Tyrosine-like C3	Bacteroidota	Bacteroidia_unclassified	ASV1393	-0.436	0.011
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV1397	-0.443	0.010
Tyrosine-like C3	Bacteroidota	Cryomorphaceae	ASV1400	-0.444	0.010
Tyrosine-like C3	Pseudomonadota	OM60(NOR5)_clade	ASV1417	-0.376	0.031
Tyrosine-like C3	Pseudomonadota	Defluviicoccales	ASV1477	-0.411	0.017
Tyrosine-like C3	Bdellovibrionota	Pseudobacteriovorax	ASV1491	-0.460	0.007

Tyrosine-like C3	Pseudomonadota	Gammaproteobacteria_unclassified	ASV1500	-0.436	0.011
Tyrosine-like C3	Pseudomonadota	IS-44	ASV1504	-0.540	0.001
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV1534	-0.366	0.036
Tyrosine-like C3	Pseudomonadota	Magnetospiraceae	ASV1594	-0.439	0.011
Tyrosine-like C3	Verrucomicrobiota	Roseibacillus	ASV1618	-0.530	0.002
Tyrosine-like C3	Bacteroidota	NS5_marine_group	ASV1629	-0.453	0.008
Tyrosine-like C3	Cyanobacteriota	Cyanobiaceae_unclassified	ASV1653	-0.380	0.029
Tyrosine-like C3	Pseudomonadota	SAR116_clade	ASV1661	-0.453	0.008
Tyrosine-like C3	Bacteroidota	Crocinitomicaceae_unclassified	ASV1710	-0.382	0.028
Tyrosine-like C3	Pseudomonadota	Candidatus_Hepatincola_insertae_sedis_family	ASV1734	-0.353	0.044
Tyrosine-like C3	Cyanobacteriota	Cyanobium_PCC-6307	ASV1772	-0.379	0.029
Tyrosine-like C3	Bacteroidota	Flavobacteriaceae	ASV1835	-0.365	0.037
Tyrosine-like C3	Bdellovibrionota	OM27_clade	ASV1836	-0.406	0.019
Tyrosine-like C3	Bacteroidota	NS11-12_marine_group	ASV2059	-0.414	0.017
Tyrosine-like C3	Actinomycetota	Candidatus_Actinomarina	ASV2086	-0.372	0.033
Tyrosine-like C3	Pseudomonadota	Francisella	ASV2102	-0.430	0.013
Tyrosine-like C3	Verrucomicrobiota	SCGC_AAA164-E04	ASV2152	-0.391	0.025
Tyrosine-like C3	SAR324_clade(Marine_group_B)	SAR324_clade_insertae_sedis	ASV2310	-0.388	0.026
Tyrosine-like C3	Thermodesulfobacteriota	Bradymonadales	ASV2334	-0.383	0.028
Tyrosine-like C3	Verrucomicrobiota	SCGC_AAA164-E04	ASV2502	-0.346	0.048
Tyrosine-like C3	Pseudomonadota	Gammaproteobacteria_unclassified	ASV2568	-0.350	0.046
Tyrosine-like C3	Bacteria_unclassified	Bacteria_unclassified	ASV2637	-0.354	0.043
Tyrosine-like C3	Pseudomonadota	Paracoccaceae_unclassified	ASV3159	-0.365	0.037
Surfactant	Pseudomonadota	SAR86_clade	ASV008	0.464	0.011
Surfactant	Actinomycetota	Candidatus_Actinomarina	ASV011	0.407	0.028
Surfactant	Pseudomonadota	SAR86_clade	ASV014	0.417	0.024
Surfactant	Bacteroidota	NS5_marine_group	ASV025	0.461	0.012
Surfactant	Pseudomonadota	Candidatus_Punicispirillum	ASV037	0.370	0.048
Surfactant	Pseudomonadota	SAR86_clade	ASV048	0.509	0.005
Surfactant	Pseudomonadota	SUP05_cluster	ASV058	0.536	0.003
Surfactant	Pseudomonadota	OCS116_clade	ASV062	0.574	0.001
Surfactant	Pseudomonadota	Amylibacter	ASV082	0.404	0.030
Surfactant	Pseudomonadota	OM43_clade	ASV088	0.495	0.006

Surfactant	Pseudomonadota	AEGEAN-169_marine_group	ASV100	0.442	0.016
Surfactant	Bacteroidota	NS9_marine_group	ASV136	0.477	0.009
Surfactant	Pseudomonadota	AEGEAN-169_marine_group	ASV139	0.519	0.004
Surfactant	Pseudomonadota	Pseudohongiella	ASV146	0.534	0.003
Surfactant	Pseudomonadota	Paracoccaceae_unclassified	ASV149	0.531	0.003
Surfactant	Bacteroidota	NS9_marine_group	ASV166	0.413	0.026
Surfactant	Bacteroidota	Flavobacteriaceae	ASV169	0.392	0.035
Surfactant	Bacteroidota	NS5_marine_group	ASV171	0.421	0.023
Surfactant	Actinomycetota	Candidatus_Actinomarina	ASV175	0.460	0.012
Surfactant	Pseudomonadota	OM60(NOR5)_clade	ASV179	0.423	0.022
Surfactant	Pseudomonadota	Asciidiaceihabitans	ASV182	0.389	0.037
Surfactant	Pseudomonadota	OM75_clade	ASV183	0.461	0.012
Surfactant	Pseudomonadota	Ectothiorhodospiraceae	ASV198	0.471	0.010
Surfactant	Bacteroidota	NS9_marine_group	ASV212	0.395	0.034
Surfactant	Pseudomonadota	UBA10353_marine_group	ASV214	0.465	0.011
Surfactant	Pseudomonadota	Porticoccus	ASV224	0.578	0.001
Surfactant	Pseudomonadota	Pseudohongiella	ASV227	0.593	0.001
Surfactant	Pseudomonadota	SAR86_clade	ASV246	0.579	0.001
Surfactant	Pseudomonadota	Clade_IV	ASV251	0.598	0.001
Surfactant	Pseudomonadota	Defluviicoccales	ASV264	0.454	0.013
Surfactant	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV277	0.444	0.016
Surfactant	Pseudomonadota	IS-44	ASV278	0.610	0.000
Surfactant	Pseudomonadota	Leucotrichaceae	ASV294	0.495	0.006
Surfactant	Pseudomonadota	Woeseia	ASV302	0.453	0.014
Surfactant	Actinomycetota	Candidatus_Actinomarina	ASV305	0.425	0.022
Surfactant	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV309	0.435	0.018
Surfactant	Bacteroidota	NS5_marine_group	ASV310	0.377	0.044
Surfactant	Bacteroidota	NS9_marine_group	ASV330	0.471	0.010
Surfactant	Pseudomonadota	SAR86_clade	ASV360	0.546	0.002
Surfactant	Pseudomonadota	OM182_clade	ASV396	0.540	0.003
Surfactant	Actinomycetota	Candidatus_Actinomarina	ASV399	0.386	0.039
Surfactant	Pseudomonadota	OM43_clade	ASV408	0.439	0.017
Surfactant	Pseudomonadota	KI89A_clade	ASV415	0.505	0.005
Surfactant	Planctomycetota	Pla3_lineage	ASV419	0.526	0.003
Surfactant	Pseudomonadota	Clade_II	ASV428	0.389	0.037
Surfactant	Pseudomonadota	Coxiella	ASV430	0.554	0.002
Surfactant	Pseudomonadota	Candidatus_Puniceispirillum	ASV453	0.452	0.014
Surfactant	Pseudomonadota	Haliaceae_unclassified	ASV467	0.502	0.006
Surfactant	Verrucomicrobiota	SCGC_AAA164-E04	ASV483	0.498	0.006
Surfactant	Pseudomonadota	Asciidiaceihabitans	ASV490	0.503	0.005
Surfactant	Pseudomonadota	Defluviicoccales	ASV495	0.436	0.018

Surfactant	Pseudomonadota	Marivibrio	ASV500	0.416	0.025
Surfactant	Verrucomicrobiota	MB11C04_marine_group	ASV516	0.439	0.017
Surfactant	Pseudomonadota	Clade_IV	ASV517	0.369	0.049
Surfactant	Bacteroidota	Saprospiraceae	ASV531	0.438	0.018
Surfactant	Verrucomicrobiota	MB11C04_marine_group	ASV540	0.390	0.036
Surfactant	Pseudomonadota	Paracoccaceae_unclassified	ASV558	0.423	0.022
Surfactant	Pseudomonadota	OM182_clade	ASV585	0.370	0.048
Surfactant	Pseudomonadota	Defluviicoccales	ASV588	0.569	0.001
Surfactant	Verrucomicrobiota	MB11C04_marine_group	ASV595	0.567	0.001
Surfactant	Bacteroidota	Crocinitomicaceae_unclassified	ASV603	0.416	0.025
Surfactant	Pseudomonadota	SAR86_clade	ASV611	0.407	0.029
Surfactant	Thermodesulfobacteriota	Thermodesulfobacteriota	ASV619	0.479	0.009
Surfactant	Pseudomonadota	SAR116_clade	ASV620	0.525	0.003
Surfactant	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV621	0.570	0.001
Surfactant	Pseudomonadota	SAR92_clade	ASV631	0.422	0.023
Surfactant	Pseudomonadota	Litorivicinus	ASV639	0.411	0.027
Surfactant	Bacteroidota	Flavobacteriaceae_unclassified	ASV656	0.407	0.028
Surfactant	Pseudomonadota	Paracoccaceae_unclassified	ASV682	0.421	0.023
Surfactant	Pseudomonadota	Legionellaceae	ASV701	0.405	0.029
Surfactant	Bacteroidota	NS5_marine_group	ASV713	0.374	0.046
Surfactant	Planctomycetota	OM190	ASV722	0.505	0.005
Surfactant	Pseudomonadota	Ga0077536	ASV728	0.533	0.003
Surfactant	Bacteroidota	Crocinitomix	ASV783	0.496	0.006
Surfactant	Bacteroidota	Bacteroidia_unclassified	ASV788	0.387	0.038
Surfactant	Pseudomonadota	Pseudomonadales_unclassified	ASV790	0.420	0.023
Surfactant	Bacteroidota	NS9_marine_group	ASV841	0.394	0.035
Surfactant	Pseudomonadota	Puniceispirillales	ASV844	0.437	0.018
Surfactant	Actinomycetota	Actinobacteria_unclassified	ASV877	0.470	0.010
Surfactant	Pseudomonadota	Pseudoalteromonas	ASV915	0.466	0.011
Surfactant	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV922	0.574	0.001
Surfactant	Bacteroidota	NS5_marine_group	ASV993	0.410	0.027
Surfactant	Pseudomonadota	Defluviicoccales	ASV1065	0.400	0.032
Surfactant	Pseudomonadota	SAR86_clade	ASV1079	0.467	0.011
Surfactant	Actinomycetota	Sva0996_marine_group	ASV1196	0.377	0.044
Surfactant	Pseudomonadota	SAR86_clade	ASV1349	0.446	0.015
Surfactant	Pseudomonadota	SAR86_clade	ASV1410	0.601	0.001
Surfactant	Pseudomonadota	Coxiella	ASV1854	0.545	0.002
Surfactant	Bacteroidota	NS9_marine_group	ASV1965	0.396	0.033
Surfactant	Cyanobacteriota	Synechococcus_CC9902	ASV001	-0.406	0.029
Surfactant	Bacteroidota	NS2b_marine_group	ASV052	-0.378	0.043
Surfactant	Marinimicrobia_(SAR406_clade)	Marinimicrobia_(SAR406_clade)	ASV350	-0.384	0.039

Surfactant	Pseudomonadota	Alphaproteobacteria_unclassified	ASV665	-0.385	0.039
Surfactant	Pseudomonadota	Magnetospiraceae	ASV1594	-0.378	0.043
Surfactant	Pseudomonadota	Unknown_Family	ASV1814	-0.367	0.050
Surfactant	Actinomycetota	Acidimicrobiia_unclassified	ASV1941	-0.375	0.045
Surfactant	Bacteroidota	NS9_marine_group	ASV2083	-0.368	0.050
Surfactant	Pseudomonadota	Clade_I_unclassified	ASV2255	-0.394	0.035

**Table S8:** Protist ASVs significantly correlating with DOM variables.

<b>DOM Variable</b>	<b>Division</b>	<b>Genus</b>	<b>ASV</b>	<b>Pearson Correlation Coefficient</b>	<b>P Value</b>
Tryptophan-like C1	Chlorophyta	Bathycoccus	ASV008	0.416	0.020
Tryptophan-like C1	Alveolata	Dinophyceae_unclassified	ASV011	0.509	0.003
Tryptophan-like C1	Stramenopiles	Minidiscus	ASV017	0.407	0.023
Tryptophan-like C1	Picozoa	Picomonas	ASV027	0.455	0.010
Tryptophan-like C1	Alveolata	Prorocentrum	ASV029	0.552	0.001
Tryptophan-like C1	Chlorophyta	Micromonas	ASV036	0.462	0.009
Tryptophan-like C1	Stramenopiles	Pelagomonadales_clade_B1	ASV041	0.533	0.002
Tryptophan-like C1	Stramenopiles	Aureococcus	ASV042	0.496	0.005
Tryptophan-like C1	Chlorophyta	Pseudoscourfieldia	ASV084	0.590	0.000
Tryptophan-like C1	Alveolata	Suessiaceae_unclassified	ASV089	0.382	0.034
Tryptophan-like C1	Cryptophyta	Teleaulax	ASV091	0.397	0.027
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-8_X	ASV130	0.409	0.022
Tryptophan-like C1	Cryptophyta	Teleaulax	ASV171	0.482	0.006
Tryptophan-like C1	Stramenopiles	MAST-1C	ASV175	0.382	0.034
Tryptophan-like C1	Alveolata	Dinophyceae_unclassified	ASV182	0.494	0.005
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-1_X	ASV200	0.438	0.014
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-7_X	ASV212	0.472	0.007
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-17_X	ASV213	0.454	0.010
Tryptophan-like C1	Stramenopiles	MAST-7B	ASV237	0.428	0.016
Tryptophan-like C1	Alveolata	Dino-Group-I-Clade-1_X	ASV253	0.501	0.004
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-14_X	ASV283	0.424	0.017
Tryptophan-like C1	Alveolata	Dinophyceae_unclassified	ASV294	0.563	0.001
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-1_X	ASV306	0.661	0.000
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-12_X	ASV399	0.597	0.000
Tryptophan-like C1	Alveolata	Prorocentrum	ASV408	0.487	0.005
Tryptophan-like C1	Stramenopiles	MAST-1B	ASV450	0.414	0.020
Tryptophan-like C1	Alveolata	Dino-Group-III_XX	ASV505	0.356	0.050

Tryptophan-like C1	Alveolata	Dinophyceae_unclassified	ASV511	0.583	0.001
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-12_X	ASV565	0.379	0.035
Tryptophan-like C1	Telonemia	Telonemia-Group-2_X	ASV610	0.398	0.027
Tryptophan-like C1	Alveolata	Prorocentrum	ASV664	0.411	0.022
Tryptophan-like C1	Telonemia	Telonemia-Group-2_X	ASV709	0.512	0.003
Tryptophan-like C1	Alveolata	Dino-Group-I-Clade-4_X	ASV726	0.382	0.034
Tryptophan-like C1	Chlorophyta	Ostreococcus	ASV757	0.379	0.035
Tryptophan-like C1	Telonemia	Telonemia-Group-2_X	ASV792	0.493	0.005
Tryptophan-like C1	Alveolata	Dino-Group-II_unclassified	ASV808	0.361	0.046
Tryptophan-like C1	Chlorophyta	Ostreococcus	ASV886	0.428	0.016
Tryptophan-like C1	Rhizaria	Cercozoa_unclassified	ASV1059	0.547	0.001
Tryptophan-like C1	Chlorophyta	Ostreococcus	ASV1187	0.433	0.015
Tryptophan-like C1	Rhizaria	Filosa-Thecofilosea_unclassified	ASV1524	0.419	0.019
Tryptophan-like C1	Chlorophyta	Chloroparvula	ASV1850	0.438	0.014
Tryptophan-like C1	Alveolata	Gyrodinium	ASV021	-0.447	0.012
Tryptophan-like C1	Alveolata	Gyrodinium	ASV063	-0.385	0.033
Tryptophan-like C1	Alveolata	Dino-Group-II-Clade-20_X	ASV087	-0.364	0.044
Tryptophan-like C1	Alveolata	Lepidodinium	ASV211	-0.367	0.043
Tryptophan-like C1	Alveolata	Strombidiidae_X	ASV247	-0.364	0.044
Tryptophan-like C1	Alveolata	Oligotrichida_XX	ASV373	-0.416	0.020
Tryptophan-like C1	Alveolata	Scrippsiella	ASV898	-0.355	0.050
Humic-like C2	Alveolata	Dinophyceae_unclassified	ASV030	0.394	0.028
Humic-like C2	Alveolata	Dino-Group-II-Clade-5_X	ASV093	0.433	0.015
Humic-like C2	Alveolata	Dino-Group-II-Clade-1_X	ASV106	0.399	0.026
Humic-like C2	Alveolata	Karlodinium	ASV165	0.406	0.024
Humic-like C2	Alveolata	Strombidiidae_X	ASV247	0.365	0.044
Humic-like C2	Stramenopiles	MAST-3E	ASV282	0.467	0.008
Humic-like C2	Chlorophyta	Picochlorum	ASV456	0.370	0.041
Humic-like C2	Stramenopiles	Haliphthorales_unclassified	ASV714	0.360	0.047
Humic-like C2	Alveolata	Dinophyceae_unclassified	ASV294	-0.384	0.033

Humic-like C2	Alveolata	Dinophyceae_unclassified	ASV1151	-0.366	0.043
Humic-like C2	Alveolata	Dinophyceae_unclassified	ASV1355	-0.388	0.031
Humic-like C2	Alveolata	Dinophyceae_unclassified	ASV1993	-0.497	0.004
Humic-like C3	Alveolata	Dinophyceae_unclassified	ASV078	0.455	0.010
Humic-like C3	Alveolata	Dino-Group-I-Clade-4_X	ASV159	0.431	0.016
Humic-like C3	Alveolata	Strombidiidae_X	ASV162	0.492	0.005
Humic-like C3	Alveolata	Strombidiidae_X	ASV233	0.390	0.030
Humic-like C3	Alveolata	Strombidiidae_X	ASV247	0.453	0.011
Humic-like C3	Alveolata	Dino-Group-I-Clade-5_X	ASV276	0.365	0.043
Humic-like C3	Stramenopiles	MAST-3E	ASV282	0.400	0.026
Humic-like C3	Alveolata	Oligotrichida_XX	ASV373	0.422	0.018
Humic-like C3	Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV524	0.440	0.013
Humic-like C3	Alveolata	Strombidiidae_X	ASV682	0.397	0.027
Humic-like C3	Stramenopiles	Bacillariaceae_unclassified	ASV887	0.425	0.017
Humic-like C3	Alveolata	Scrippsiella	ASV898	0.375	0.038
Humic-like C3	Alveolata	Gymnodinium	ASV309	-0.420	0.019
Humic-like C3	Alveolata	Dino-Group-II_unclassified	ASV841	-0.429	0.016
Humic-like C3	Alveolata	Dinophyceae_XXX	ASV855	-0.367	0.042
Humic-like C3	Alveolata	Dino-Group-I-Clade-1_X	ASV872	-0.418	0.019
Humic-like C3	Alveolata	Dinophyceae_unclassified	ASV1151	-0.415	0.020
Humic-like C3	Alveolata	Dinophyceae_unclassified	ASV1355	-0.444	0.012
Humic-like C3	Alveolata	Dinophyceae_unclassified	ASV1993	-0.528	0.002
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-6_X	ASV012	0.583	0.001
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV025	0.562	0.001
Tyrosine-like C4	Alveolata	Dinophyceae_unclassified	ASV030	0.458	0.010
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV032	0.506	0.004
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-6_X	ASV039	0.564	0.001
Tyrosine-like C4	Chlorophyta	Chloropicon	ASV045	0.607	0.000
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV050	0.440	0.013
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV067	0.415	0.020

Tyrosine-like C4	Alveolata	Lepidodinium	ASV071	0.377	0.036
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV072	0.574	0.001
Tyrosine-like C4	Alveolata	Dino-Group-III_XX	ASV100	0.476	0.007
Tyrosine-like C4	Alveolata	Pelagodinium	ASV120	0.361	0.046
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-17_X	ASV140	0.440	0.013
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV149	0.561	0.001
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV166	0.573	0.001
Tyrosine-like C4	Stramenopiles	MAST-3F	ASV169	0.570	0.001
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV173	0.383	0.033
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV180	0.478	0.007
Tyrosine-like C4	Alveolata	Dino-Group-V_XX	ASV184	0.363	0.045
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV210	0.365	0.043
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV219	0.591	0.000
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-8_X	ASV226	0.510	0.003
Tyrosine-like C4	Alveolata	Dino-Group-II_XX	ASV241	0.431	0.015
Tyrosine-like C4	Alveolata	Dinophyceae_XXX	ASV254	0.364	0.044
Tyrosine-like C4	Stramenopiles	Chrysophyceae_Clade-EC2I_XX	ASV320	0.361	0.046
Tyrosine-like C4	Rhizaria	Amphibelone	ASV328	0.433	0.015
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV342	0.386	0.032
Tyrosine-like C4	Stramenopiles	MAST-1B	ASV450	0.515	0.003
Tyrosine-like C4	Stramenopiles	MOCH-5_XXX	ASV468	0.404	0.024
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-5_X	ASV477	0.380	0.035
Tyrosine-like C4	Kathablepharidacea	Kathablepharidida_XX	ASV485	0.377	0.037
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-1_X	ASV531	0.451	0.011
Tyrosine-like C4	Alveolata	Tontoniidae_unclassified	ASV550	0.381	0.034
Tyrosine-like C4	Stramenopiles	Dictyochophyceae_X_unclassified	ASV657	0.529	0.002
Tyrosine-like C4	Chlorophyta	Chloroparvula	ASV707	0.529	0.002
Tyrosine-like C4	Telonemia	Telonemia-Group-2_X	ASV709	0.359	0.047
Tyrosine-like C4	Stramenopiles	Gyrista_unclassified	ASV747	0.394	0.028
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV753	0.388	0.031

Tyrosine-like C4	Stramenopiles	MAST-3A	ASV922	0.465	0.008
Tyrosine-like C4	Alveolata	Dino-Group-II_unclassified	ASV1107	0.403	0.025
Tyrosine-like C4	Rhizaria	Filosa-Thecofilosea_unclassified	ASV1524	0.431	0.016
Tyrosine-like C4	Chlorophyta	Chloroparvula	ASV1850	0.494	0.005
Tyrosine-like C4	Alveolata	Apicomplexa_XXXX	ASV2893	0.418	0.019
Tyrosine-like C4	Alveolata	Gyrodinium	ASV003	-0.476	0.007
Tyrosine-like C4	Stramenopiles	Leptocylindrus	ASV010	-0.455	0.010
Tyrosine-like C4	Alveolata	Gymnodinium	ASV037	-0.442	0.013
Tyrosine-like C4	Alveolata	Dinophyceae_unclassified	ASV040	-0.498	0.004
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-6_X	ASV055	-0.517	0.003
Tyrosine-like C4	Stramenopiles	Guinardia	ASV065	-0.453	0.011
Tyrosine-like C4	Alveolata	Strombidiidae_X	ASV097	-0.527	0.002
Tyrosine-like C4	Chlorophyta	Picochlorum	ASV101	-0.445	0.012
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-6_X	ASV113	-0.394	0.029
Tyrosine-like C4	Alveolata	Dinophyceae_unclassified	ASV116	-0.394	0.028
Tyrosine-like C4	Chlorophyta	Chlorellales_X_unclassified	ASV117	-0.435	0.015
Tyrosine-like C4	Stramenopiles	Cyclotella	ASV121	-0.491	0.005
Tyrosine-like C4	Stramenopiles	Thalassiosiraceae_unclassified	ASV127	-0.477	0.007
Tyrosine-like C4	Alveolata	Pseudotontonia	ASV147	-0.458	0.010
Tyrosine-like C4	Alveolata	Gonyaulax	ASV148	-0.388	0.031
Tyrosine-like C4	Chlorophyta	Picochlorum	ASV154	-0.372	0.039
Tyrosine-like C4	Stramenopiles	Minutocellus	ASV161	-0.450	0.011
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-4_X	ASV198	-0.462	0.009
Tyrosine-like C4	Stramenopiles	Cyclotella	ASV234	-0.477	0.007
Tyrosine-like C4	Alveolata	Pelagostrobilidium	ASV246	-0.455	0.010
Tyrosine-like C4	Stramenopiles	Skeletonema	ASV259	-0.414	0.021
Tyrosine-like C4	Rhizaria	Ebria	ASV267	-0.431	0.016
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-13_X	ASV295	-0.477	0.007
Tyrosine-like C4	Stramenopiles	Leptocylindrus	ASV307	-0.498	0.004
Tyrosine-like C4	Kathablepharidacea	Kathablepharidida_XX	ASV310	-0.416	0.020

Tyrosine-like C4	Alveolata	Dinophyceae_unclassified	ASV346	-0.550	0.001
Tyrosine-like C4	Alveolata	Dino-Group-I-Clade-5_X	ASV366	-0.479	0.006
Tyrosine-like C4	Alveolata	Dadayiella	ASV392	-0.369	0.041
Tyrosine-like C4	Alveolata	Dino-Group-II-Clade-10-and-11_X	ASV430	-0.378	0.036
Tyrosine-like C4	Alveolata	Dinophyceae_unclassified	ASV471	-0.381	0.034
Tyrosine-like C4	Chlorophyta	Crustomastigaceae_unclassified	ASV476	-0.381	0.034
Tyrosine-like C4	Rhizaria	Cercozoa_unclassified	ASV509	-0.520	0.003
Tyrosine-like C4	Rhodophyta	Porphyridiales_X_unclassified	ASV519	-0.504	0.004
Tyrosine-like C4	Cryptophyta	Baffinella	ASV545	-0.382	0.034
Tyrosine-like C4	Alveolata	Karodinium	ASV559	-0.380	0.035
Tyrosine-like C4	Alveolata	Strombidiidae_unclassified	ASV606	-0.463	0.009
Tyrosine-like C4	Stramenopiles	MAST-6_X	ASV650	-0.474	0.007
Tyrosine-like C4	Cryptophyta	Teleaulax	ASV684	-0.386	0.032
Tyrosine-like C4	Chlorophyta	Picochlorum	ASV735	-0.403	0.024
Tyrosine-like C4	Stramenopiles	Mediolabrus	ASV781	-0.378	0.036
Tyrosine-like C4	Alveolata	Gonyaulax	ASV822	-0.410	0.022
Tyrosine-like C4	Stramenopiles	Chaetoceros	ASV873	-0.434	0.015
Tyrosine-like C4	Alveolata	Strombidiidae_X	ASV900	-0.471	0.007
Tyrosine-like C4	Alveolata	Spirotrichea_unclassified	ASV959	-0.429	0.016
Tyrosine-like C4	Chlorophyta	Marsupiomonas	ASV970	-0.431	0.015
Tyrosine-like C4	Alveolata	Gonyaulacales_unclassified	ASV1118	-0.440	0.013
Tyrosine-like C4	Chlorophyta	Chlorellales_X_unclassified	ASV1313	-0.474	0.007
Tyrosine-like C4	Cryptophyta	Plagioselmis	ASV1640	-0.445	0.012
Tyrosine-like C4	Alveolata	Heterotrichea_XXX	ASV1902	-0.431	0.015
Surfactant	Chlorophyta	Bathycoccus	ASV008	0.450	0.018
Surfactant	Alveolata	Dinophyceae_unclassified	ASV011	0.522	0.005
Surfactant	Stramenopiles	Minidiscus	ASV017	0.396	0.041
Surfactant	Chlorophyta	Micromonas	ASV023	0.426	0.027
Surfactant	Alveolata	Prorocentrum	ASV029	0.437	0.023
Surfactant	Chlorophyta	Micromonas	ASV036	0.628	0.000
Surfactant	Alveolata	Dino-Group-II-Clade-14_X	ASV038	0.443	0.021
Surfactant	Stramenopiles	Pelagomonadales_clade_B1	ASV041	0.619	0.001

Surfactant	Stramenopiles	Aureococcus	ASV042	0.582	0.001
Surfactant	Chlorophyta	Pseudosourfieldia	ASV084	0.417	0.030
Surfactant	Cryptophyta	Teleaulax	ASV091	0.621	0.001
Surfactant	Stramenopiles	MAST-3F	ASV169	0.387	0.046
Surfactant	Cryptophyta	Teleaulax	ASV171	0.393	0.042
Surfactant	Alveolata	Dinophyceae_unclassified	ASV182	0.497	0.008
Surfactant	Alveolata	Dino-Group-V_XX	ASV184	0.421	0.029
Surfactant	Chlorophyta	Micromonas	ASV199	0.654	0.000
Surfactant	Alveolata	Dino-Group-II-Clade-1_X	ASV200	0.621	0.001
Surfactant	Alveolata	Dino-Group-II-Clade-7_X	ASV212	0.649	0.000
Surfactant	Stramenopiles	MAST-7B	ASV237	0.457	0.016
Surfactant	Alveolata	Dino-Group-I-Clade-1_X	ASV253	0.591	0.001
Surfactant	Alveolata	Dinophyceae_unclassified	ASV294	0.423	0.028
Surfactant	Alveolata	Dino-Group-II-Clade-1_X	ASV306	0.598	0.001
Surfactant	Stramenopiles	MAST-3A	ASV428	0.448	0.019
Surfactant	Alveolata	Dino-Group-III_XX	ASV505	0.437	0.023
Surfactant	Alveolata	Dinophyceae_unclassified	ASV511	0.690	0.000
Surfactant	Alveolata	Dino-Group-I-Clade-1_X	ASV531	0.426	0.027
Surfactant	Alveolata	Dino-Group-II-Clade-4_X	ASV569	0.436	0.023
Surfactant	Stramenopiles	MAST-4B	ASV574	0.547	0.003
Surfactant	Telonemia	Telonemia-Group-2_X	ASV610	0.470	0.013
Surfactant	Stramenopiles	Parmales_env_3A	ASV612	0.426	0.027
Surfactant	Alveolata	Prorocentrum	ASV664	0.471	0.013
Surfactant	Chlorophyta	Picochlorum	ASV719	0.386	0.047
Surfactant	Stramenopiles	Triparma	ASV798	0.460	0.016
Surfactant	Alveolata	Dino-Group-II_unclassified	ASV808	0.425	0.027
Surfactant	Chlorophyta	Ostreococcus	ASV886	0.470	0.013
Surfactant	Alveolata	Dino-Group-II_unclassified	ASV968	0.460	0.016
Surfactant	Rhizaria	Cercozoa_unclassified	ASV1059	0.546	0.003
Surfactant	Stramenopiles	MOCH-2_XXX	ASV1906	0.391	0.044
Surfactant	Alveolata	Apicomplexa_XXXX	ASV2893	0.391	0.044

## References

- Cawley, K. M., Ding, Y., Fourqurean, J., and Jaffé, R.: Characterising the sources and fate of dissolved organic matter in Shark Bay, Australia: a preliminary study using optical properties and stable carbon isotopes, *Marine & Freshwater Research*, 63, 1098-1107, 10.1071/mf12028, 2012b.
- Cawley, K. M., Butler, K. D., Aiken, G. R., Larsen, L. G., Huntington, T. G., and McKnight, D. M.: Identifying fluorescent pulp mill effluent in the Gulf of Maine and its watershed, *Marine Pollution Bulletin*, 64, 1678-1687, <https://doi.org/10.1016/j.marpolbul.2012.05.040>, 2012a.
- Chen, M., Jung, J., Lee, Y. K., and Hur, J.: Surface accumulation of low molecular weight dissolved organic matter in surface waters and horizontal off-shelf spreading of nutrients and humic-like fluorescence in the Chukchi Sea of the Arctic Ocean, *Science of The Total Environment*, 639, 624-632, <https://doi.org/10.1016/j.scitotenv.2018.05.205>, 2018.
- Chen, M., Kim, S.-H., Jung, H.-J., Hyun, J.-H., Choi, J. H., Lee, H.-J., Huh, I.-A., and Hur, J.: Dynamics of dissolved organic matter in riverine sediments affected by weir impoundments: Production, benthic flux, and environmental implications, *Water Research*, 121, 150-161, <https://doi.org/10.1016/j.watres.2017.05.022>, 2017.
- Dainard, P. G. and Guéguen, C.: Distribution of PARAFAC modeled CDOM components in the North Pacific Ocean, Bering, Chukchi and Beaufort Seas, *Marine Chemistry*, 157, 216-223, <https://doi.org/10.1016/j.marchem.2013.10.007>, 2013.
- Devresse, Q., Becker, K. W., Dilmahamod, A. F., Ortega-Retuerta, E., and Engel, A.: Dissolved Organic Matter Fluorescence as a Tracer of Upwelling and Microbial Activities in Two Cyclonic Eddies in the Eastern Tropical North Atlantic, *Journal of Geophysical Research: Oceans*, 128, e2023JC019821, <https://doi.org/10.1029/2023JC019821>, 2023.
- Gao, Z. and Guéguen, C.: Size distribution of absorbing and fluorescing DOM in Beaufort Sea, Canada Basin, *Deep Sea Research Part I: Oceanographic Research Papers*, 121, 30-37, <https://doi.org/10.1016/j.dsr.2016.12.014>, 2017.
- Jeon, M. H., Jung, J., Park, M. O., Aoki, S., Kim, T.-W., and Kim, S.-K.: Tracing Circumpolar Deep Water and glacial meltwater using humic-like fluorescent dissolved organic matter in the Amundsen Sea, Antarctica, *Marine Chemistry*, 235, 104008, <https://doi.org/10.1016/j.marchem.2021.104008>, 2021.
- Lu, K., Gao, H., Yu, H., Liu, D., Zhu, N., and Wan, K.: Insight into variations of DOM fractions in different latitudinal rural black-odor waterbodies of eastern China using fluorescence spectroscopy coupled with structure equation model, *Science of The Total Environment*, 816, 151531, <https://doi.org/10.1016/j.scitotenv.2021.151531>, 2022.
- Philibert, M., Luo, S., Moussanas, L., Yuan, Q., Filloux, E., Zraick, F., and Murphy, K. R.: Drinking water aromaticity and treatability is predicted by dissolved organic matter fluorescence, *Water Research*, 220, 118592, <https://doi.org/10.1016/j.watres.2022.118592>, 2022.
- Tanaka, K., Kuma, K., Hamasaki, K., and Yamashita, Y.: Accumulation of humic-like fluorescent dissolved organic matter in the Japan Sea, *Scientific Reports*, 4, 5292, 10.1038/srep05292, 2014.
- Yamashita, Y., Panton, A., Mahaffey, C., and Jaffé, R.: Assessing the spatial and temporal variability of dissolved organic matter in Liverpool Bay using excitation–emission matrix fluorescence and parallel factor analysis, *Ocean Dynamics*, 61, 569-579, 10.1007/s10236-010-0365-4, 2011.