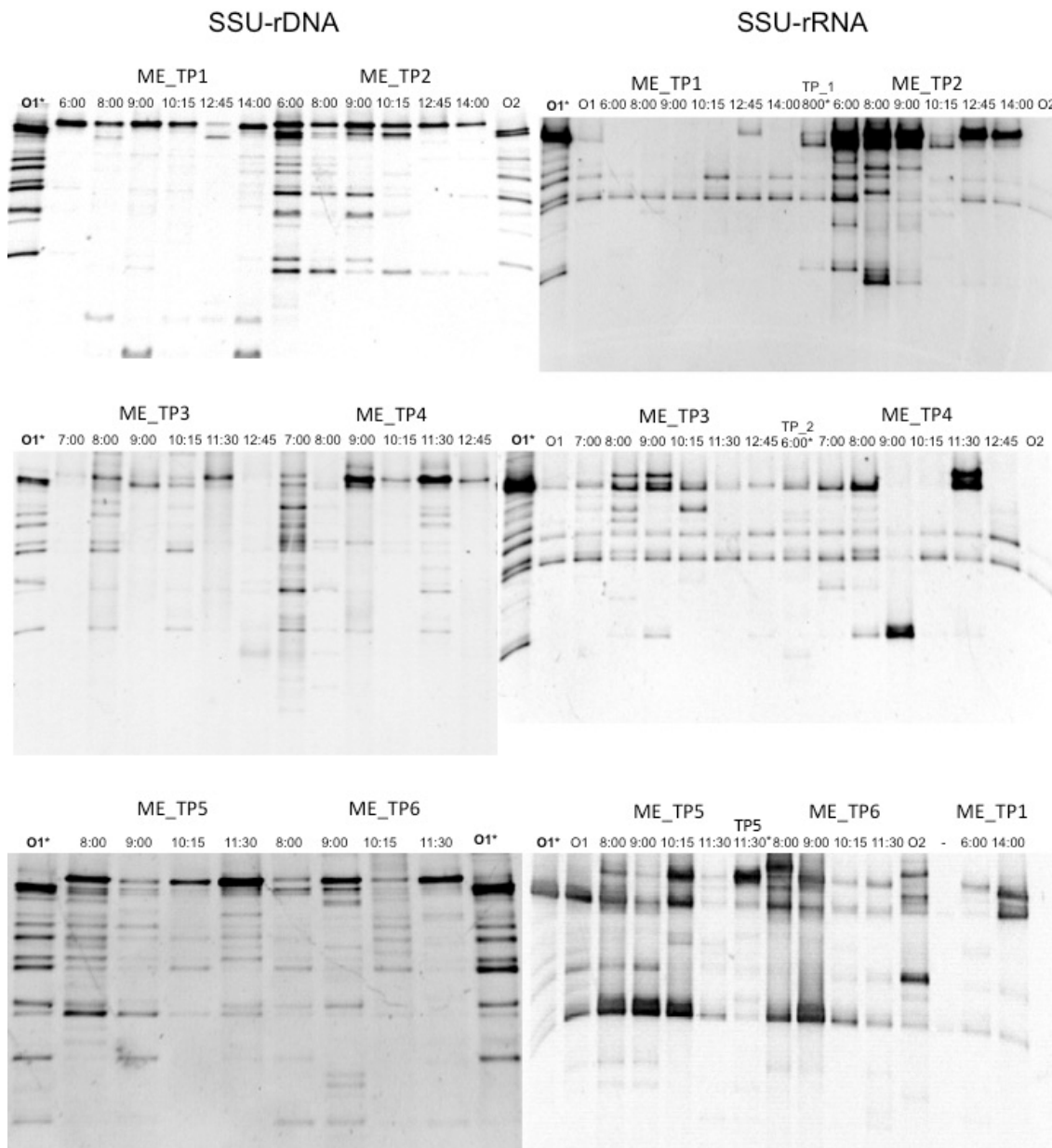


# Rapid turnover of ciliate community members in New England tide pools

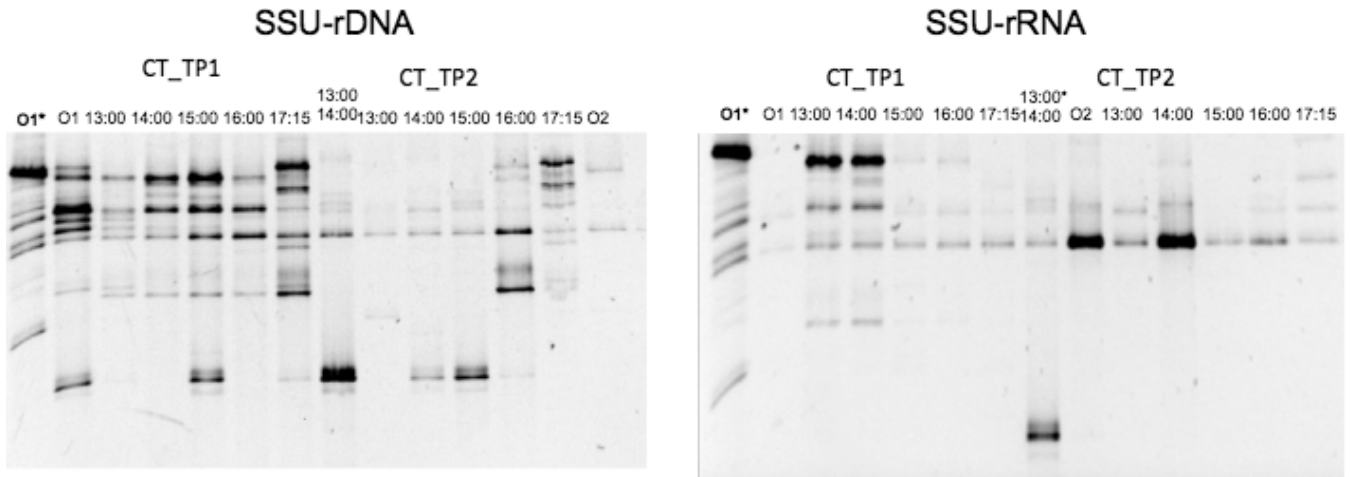
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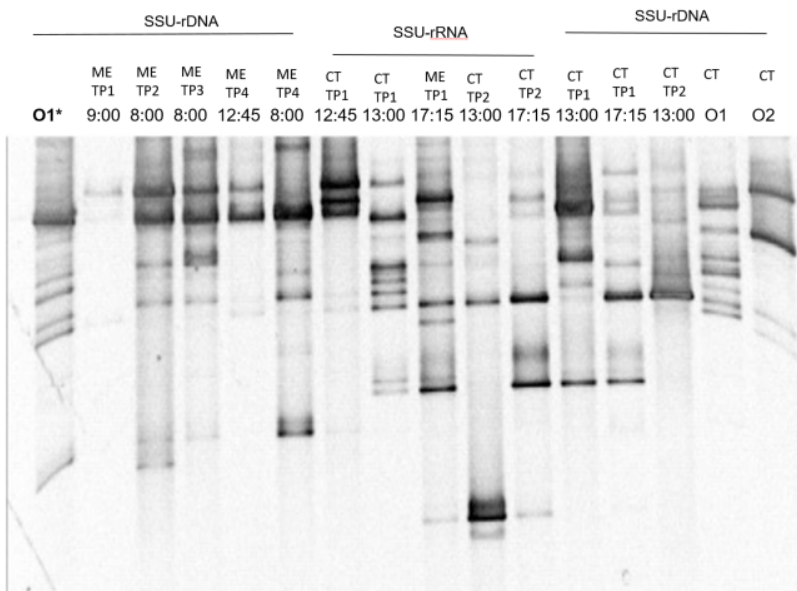
*Aquatic Microbial Ecology* 80: 43–54 (2017)



**Fig. S1.** Spirotrichea community composition assessed by DGGE (Denaturant Gradient Gel Electrophoresis) show the presence of the ciliate communities across tide pool and open ocean environments in Maine. Every tide pool has a SSU-rDNA gel (left column) and a complement SSU-rRNA gel (right column). Gels also contain initial and final open ocean samples taken at time 6:00 and 14:00. These are represented by O1 and O2 . We used the initial open ocean SSU-rDNA sample as standard for comparison across all DGGEs. This is represented by “O1\*”. Each gel contains two tide pools: upper (ME\_TP1 & ME\_TP2), middle (ME\_TP3 & ME\_TP4) and low (ME\_TP5 & ME\_TP6). The lanes are ordered from first sampling time when the tide pools was initially isolated from the open ocean, to the last sampling time when the tide pools was re-covered. “-” Indicates negative lanes. “\*”next to sampling times indicated SSU-rDNA samples used as additional standards for comparison.



**Fig. S2.** Spirotrichea community composition assessed by DGGE (Denaturant Gradient Gel Electrophoresis) show the presence of the ciliate communities across tide pool and open ocean environments in Connecticut. Both tide pools have a SSU-rDNA gel (left) and a complement SSU-rRNA gel (right). Gels contains initial and final open ocean samples taken at time 13:00 and 17:15. These are represented by O1 and O2. We used the Maine initial open ocean SSU-rDNA sample as standard for comparison across all DGGEs. This is represented by “O1\*”. The two gels contain samples from two tide pools (CT\_TP1 & CT\_TP2). The lanes are ordered from first sampling time when the tide pools was initially isolated from the open ocean, to the last sampling time during low tide. 8<sup>th</sup> lanes labeled with two sampling times represent error in our methods as two sampling times were accidentally mixed together; these lanes were not used for analysis. “\*”next to sampling times indicated SSU-rDNA samples used as additional standards for comparison.



**Fig. S3:** Band patterns of DGGE (Denaturant Gradient Gel Electrophoresis) of replicate samples from Maine and Connecticut. We used the Maine initial open ocean SSU-rDNA sample as standard for comparison across all DGGEs. This is represented by “O1\*”.

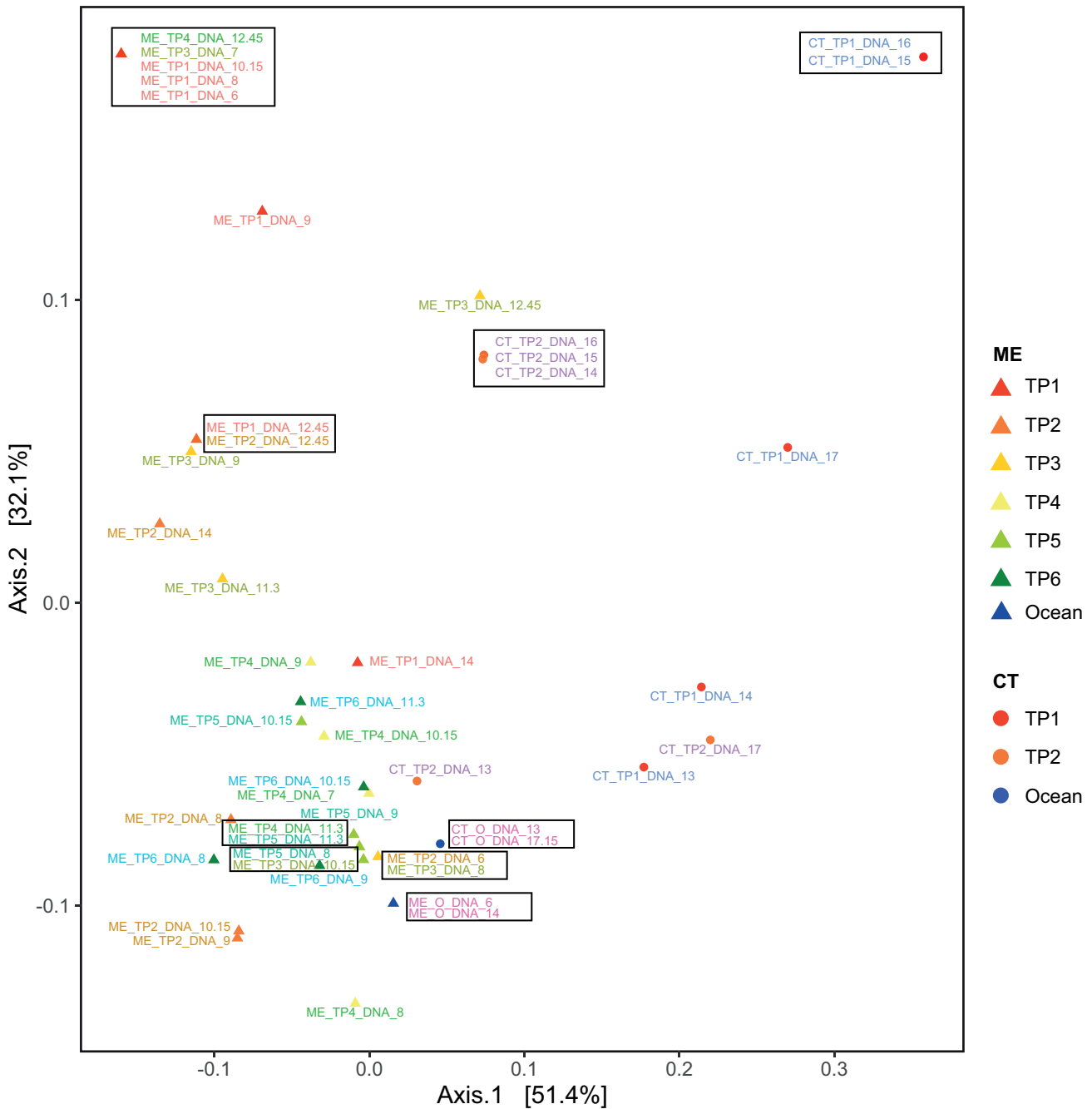
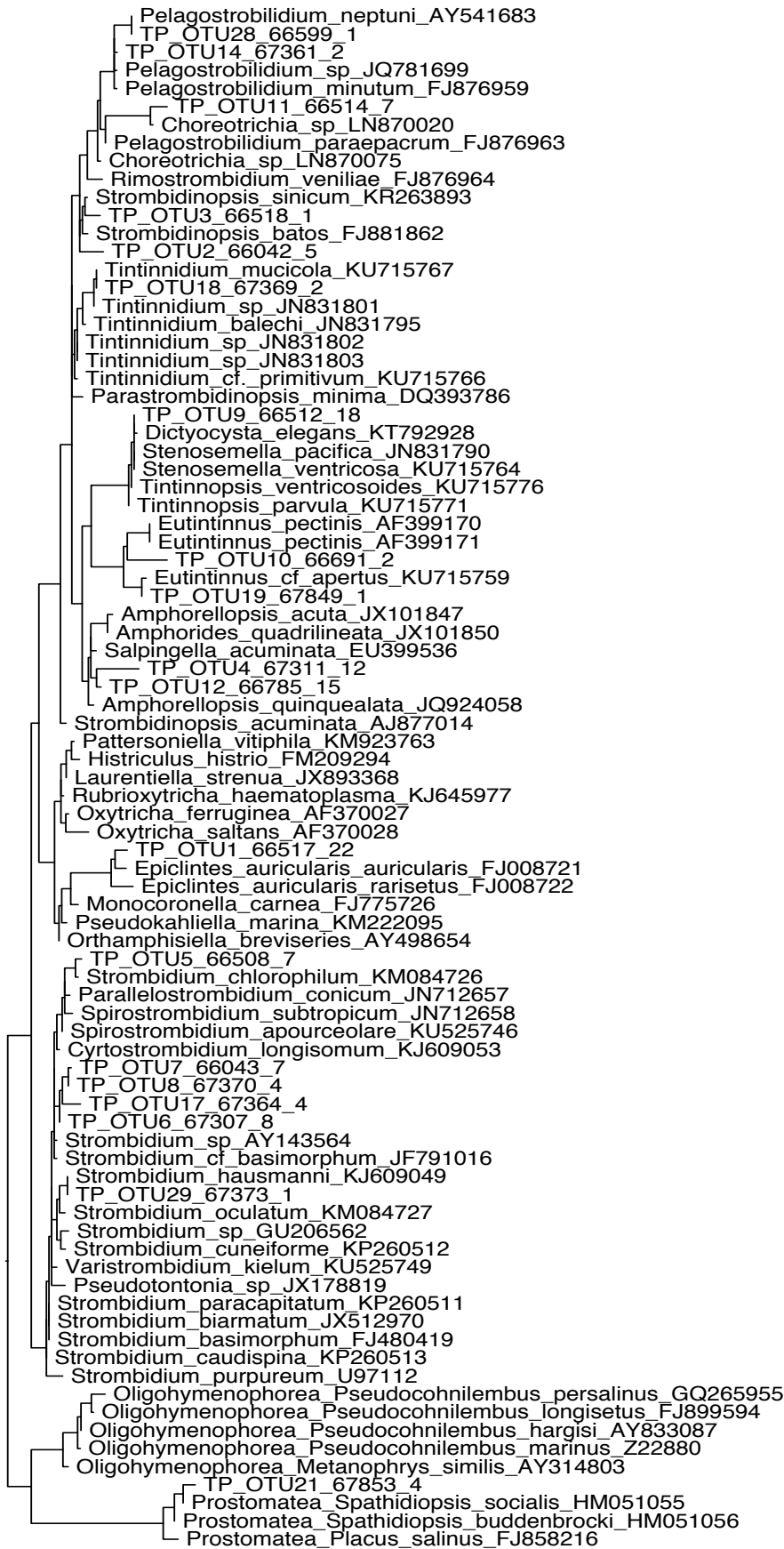


Fig. S4. Detailed principal coordinate analyses, which is shown in summary form as Figure 4 in manuscript. Sample codes indicate the location (Maine, ME; Connecticut, CE), sampling region (tide pools TP1 to TP6, or ocean, O), whether DNA or RNA, and the sampling time (h.min). Black boxes denote overlapping samples.



**Fig. S5.** Phylogenetic tree shows relationship between OTUs and morphospecies from GenBank. OTU and morphospecies sequences are aligned with Mafft E (Kato & Standley 2013) and the tree is built with RAxML v8.2.4 with the nucleotide substitution model GTR with the distribution rate gamma and proportion of invariable sites.

Table S1: OTU distribution across sampling locations in Maine from Denatured Gradient Gel (DGGE) analysis. “0” indicates the OTU was not found in that location at that sampling time. “1” indicates the OTU was found at that location during that sampling time. A bolded “1” indicates that that OTU was sequenced from the DGGE gel. “-“ Indicates there was not data available for that sampling time at that location (A) Open Ocean and upper tide pools (ME\_TP1 & ME\_TP2) (B) Middle tide pools (ME\_TP3 & METP4) (C) Lower tide pools (ME\_TP5 & ME\_TP6)

A) SSU-rDNA	Open Ocean				-----ME_TP1-----								-----ME_TP2-----																
	SSU-rRNA				-----SSU-rDNA-----				-----SSU-rRNA-----				-----SSU-rDNA-----				-----SSU-rRNA-----												
	6:00	14:00	6:00	14:00	6:00	8:00	9:00	10:15	12:45	14:00	6:00	8:00	9:00	10:15	12:45	14:00	6:00	8:00	9:00	10:15	12:45	14:00	6:00	8:00	9:00	10:15	12:45	14:00	
OTU1	0	0	0	0	1	1	<b>1</b>	<b>1</b>	1	1	<b>1</b>	-	1	-	-	1	<b>1</b>	1	1	1	1	1	<b>1</b>	<b>1</b>	<b>1</b>	1	<b>1</b>		
OTU2	<b>1</b>	1	1	1	0	0	0	0	0	1	1	-	0	-	-	1	1	1	1	1	0	0	1	1	1	0	1	1	
OTU3	1	1	0	1	0	0	0	0	<b>1</b>	0	1	-	1	-	-	1	1	1	1	0	1	0	1	1	1	0	1	1	
OUT4	1	1	0	1	0	0	0	0	0	0	<b>1</b>	-	0	-	-	1	1	1	1	1	0	0	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	1	1	
OTU5	<b>1</b>	1	0	0	0	0	1	0	0	1	<b>1</b>	-	0	-	0	0	<b>1</b>	0	0	0	0	0	1	0	0	0	0	0	
OTU6	<b>1</b>	1	0	0	0	0	0	0	0	<b>1</b>	1	-	0	-	-	0	1	0	0	0	0	0	0	<b>1</b>	<b>1</b>	<b>1</b>	0	0	0
OTU7	1	1	1	1	0	0	0	0	0	1	0	-	0	-	-	1	1	0	0	0	0	0	0	0	0	0	0	0	
OTU8	1	1	0	0	0	0	0	0	0	1	0	-	0	-	-	0	1	0	0	0	0	0	0	1	0	0	0	0	
OTU9	<b>1</b>	1	1	1	0	0	0	0	0	0	<b>1</b>	-	1	-	-	1	1	1	<b>1</b>	1	0	1	<b>1</b>	1	0	0	1	<b>1</b>	
OTU10	<b>1</b>	1	0	1	0	0	0	0	0	0	0	-	0	-	-	0	1	0	1	1	0	0	0	0	0	0	0	0	
OTU11	<b>1</b>	1	0	0	0	0	0	0	0	0	0	-	0	-	-	0	1	0	0	0	0	0	0	0	0	0	0	0	
OTU12	<b>1</b>	1	0	0	0	0	0	0	0	0	<b>1</b>	<b>1</b>	-	0	-	-	0	<b>1</b>	0	0	1	0	0	<b>1</b>	0	0	0	0	
OTU13	0	0	0	0	0	0	<b>1</b>	0	0	1	0	-	0	-	-	0	<b>1</b>	1	0	<b>1</b>	<b>1</b>	1	0	1	0	<b>1</b>	1	0	0
OTU14	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU15	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU16	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU17	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	1	0	0	
OTU18	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU19	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU20	0	0	0	<b>1</b>	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU21	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU22	0	0	<b>1</b>	0	0	0	0	0	0	0	<b>1</b>	-	0	-	-	0	1	0	0	0	0	0	0	0	<b>1</b>	0	0	0	
OTU23	0	0	0	0	0	<b>1</b>	0	0	0	<b>1</b>	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU24	0	0	0	0	0	0	<b>1</b>	0	0	<b>1</b>	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU25	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	<b>1</b>	0	0	0	0	0	0	0	0	0	0	0	0	
OTU26	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU27	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	<b>1</b>	0	0	0	0	0	0	0	0	0	0	0	
OTU28	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU29	0	0	0	0	0	0	0	0	0	0	1	-	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	
OTU30	0	0	0	0	0	0	0	0	0	0	0	-	0	-	-	<b>1</b>	0	0	0	0	0	0	0	0	0	0	0	0	

B)	-----ME_TP3-----											-----ME_TP4-----												
	-----SSU-rDNA-----					-----SSU-rRNA-----						-----SSU-rDNA-----					-----SSU-rRNA-----							
	7:00	8:00	9:00	10:15	11:30	12:45	7:00	8:00	9:00	10:15	11:30	12:45	7:00	8:00	9:00	10:15	11:30	12:45	7:00	8:00	9:00	10:15	11:30	12:45
OTU1	1	1	1	0	1	0	0	1	1	0	0	0	1	0	1	0	1	1	0	0	0	0	1	0
OTU2	0	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	0	1	0
OTU3	0	1	0	0	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	1	0
OTU4	0	1	0	1	0	0	0	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	0	0
OTU5	0	1	0	1	0	0	0	1	0	1	0	0	1	1	0	0	1	0	0	1	0	0	0	0
OTU6	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0
OTU7	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
OTU8	0	1	0	1	0	0	0	1	1	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0
OTU9	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
OTU10	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
OTU11	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
OTU12	0	1	0	1	0	0	0	0	1	0	0	0	1	0	1	0	1	0	0	1	1	0	0	0
OTU13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
OTU23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

c)	ME_TP5								ME_TP6							
	SSU-rDNA				SSU-rRNA				SSU-rDNA				SSU-rRNA			
	8:00	9:00	10:15	11:30	8:00	9:00	10:15	11:30	8:00	9:00	10:15	11:30	8:00	9:00	10:15	11:30
OTU1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OTU2	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1
OTU3	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1
OUT4	1	0	0	1	1	1	0	1	0	1	1	0	1	1	0	0
OTU5	1	0	0	1	1	0	1	1	0	1	1	0	0	0	1	1
OTU6	1	1	0	1	1	1	0	1	0	1	1	1	0	0	0	0
OTU7	1	1	1	1	1	1	0	1	0	0	1	0	0	0	1	1
OTU8	1	1	0	1	1	1	1	1	0	0	1	0	0	0	0	0
OTU9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OTU10	1	1	0	1	1	1	0	1	1	1	1	0	1	1	0	0
OTU11	1	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0
OTU12	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	1
OTU13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU15	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1
OTU16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU22	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1
OTU23	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU28	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table S2: OTU distribution across sampling locations in Connecticut (CT\_TP1 & CT\_TP2) from Denatured Gradient Gel (DGGE) analysis. “0” indicates the OTU was not found in that location at that sampling time. “1” indicates the OTU was found at that location during that sampling time. A bolded “1” indicates that that OTU was sequenced from the DGGE gel. “-” Indicates there was not data available for that sampling time at that location

	Open Ocean				CT_TP1								CT_TP2											
	SSU-rDNA		SSU-rRNA		SSU-rDNA				SSU-rRNA				SSU-rDNA				SSU-rRNA							
	13:00	17:15	13:00	17:15	13:00	14:00	15:00	16:00	17:15	13:00	14:00	15:00	16:00	17:15	13:00	14:00	15:00	16:00	17:15	13:00	14:00	15:00	16:00	17:15
OTU 14	1	1	1	1	1	0	0	0	<b>1</b>	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0
OTU 15	1	1	0	0	0	0	1	0	0	0	0	0	0	1	<b>1</b>	0	1	<b>1</b>	0	0	0	0	0	0
OTU 16	1	0	0	0	0	0	1	0	0	0	0	0	0	0	<b>1</b>	0	1	<b>1</b>	0	0	0	0	0	0
OTU 17	<b>1</b>	1	1	<b>1</b>	<b>1</b>	1	1	<b>1</b>	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1
OTU 18	<b>1</b>	1	1	1	<b>1</b>	1	0	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0	0	1
OTU 19	1	<b>1</b>	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1
OTU 21	0	0	0	0	<b>1</b>	1	1	1	<b>1</b>	1	<b>1</b>	0	0	1	0	0	0	0	1	0	0	0	0	0
OTU 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	<b>1</b>	0	0	0	0	0	0	0
OTU 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OUT 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 8	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OTU 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0