Table S1. Number of 16S rRNA sequence reads before and after processing.

	Raw Reads (Mean per Sample)	**Post CFF-Processing Reads (Mean per Sample)**
Oyster EF Samples (n = 32)	390,367 (10,844)	151,651 (4,213)
Water Samples (n = 24)	249,389 (10,391)	112,585 (4,691)
Total	639,756 (10,663)	264,236 (4,404)

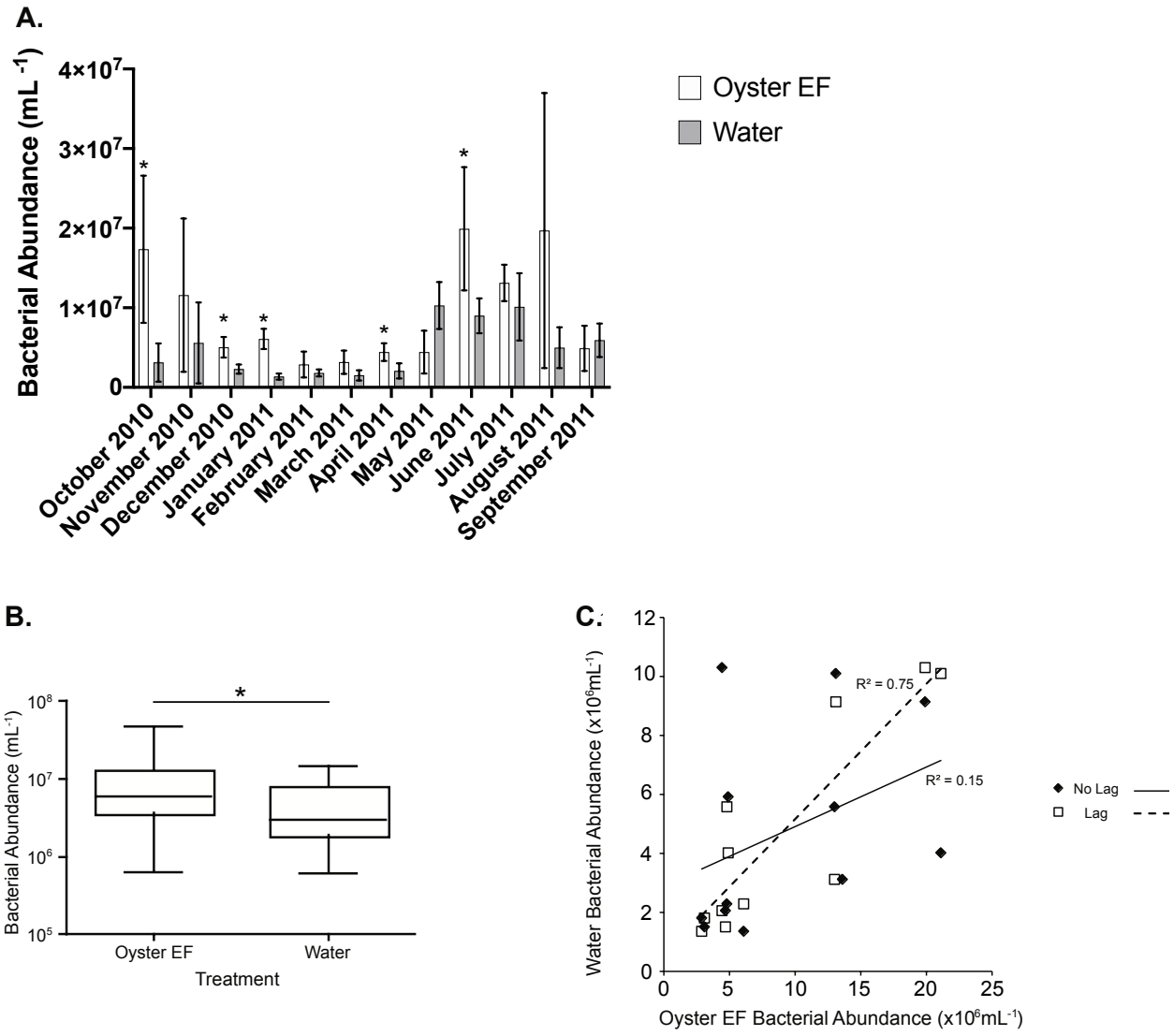

Fig. S1. Bacterial abundance of oyster extrapallial fluid (EF) and water samples from the Smithsonian Environmental Research Center collected monthly from October 2010 to September 2011. Bacterial abundance was determined by direct counts with epifluorescence microscopy. A) Mean monthly bacterial abundances of EF and water samples. Treatment (oyster EF vs. water), time, and treatment x time all significantly ($p < 0.05$) impacted bacterial abundance in a mixed-model ANOVA. An asterisk indicates significantly different (Mann-Whitney, $p < 0.05$) abundances between EF and water in the same month. Error bars are SD. B) Mean bacterial abundance of all oyster EF ($n = 52$) and water ($n = 48$) samples collected during the annual study (Mann-Whitney, $p < 0.001$). C) Linear regression of mean monthly EF and water bacterial abundances without a lag and with EF bacterial abundances lagging water bacterial abundances by one month.

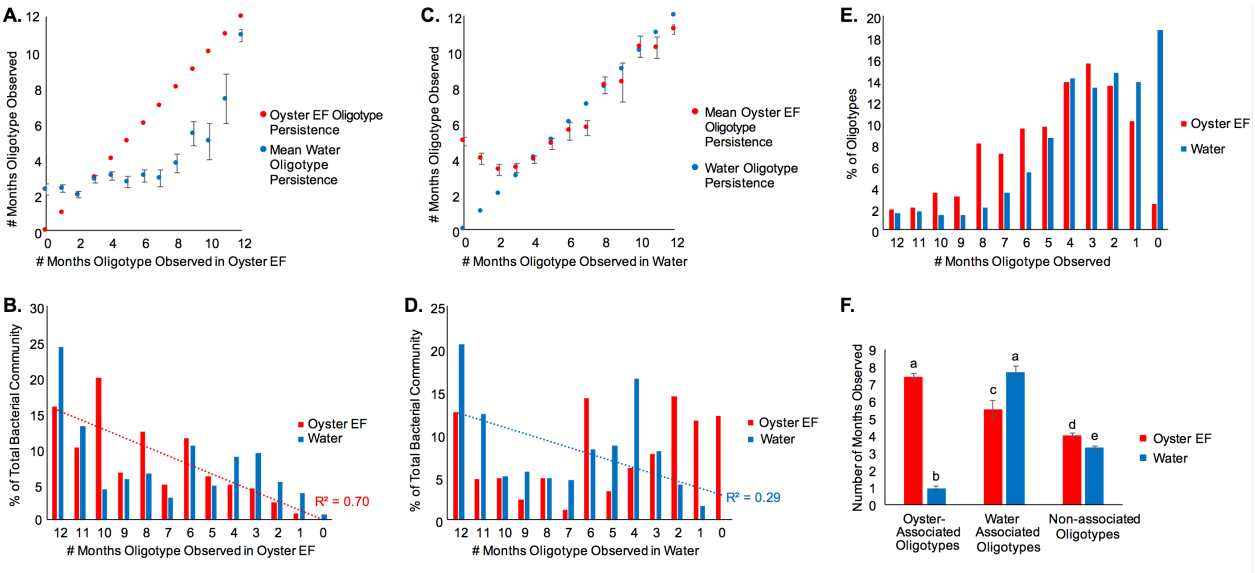

Fig. S2. Oligotype persistence (# months observed) and relative abundance in oyster EF and water samples from October 2010 to September 2011 in the Rhode River (Edgewater, MD). A) Oligotype persistence in oyster EF and water samples as a function of their persistence in oyster EF. B) The mean proportion of oyster EF and water bacterial communities as a function of oligotype persistence in oyster EF. Dotted line denotes regression trend line of the mean proportion of the oyster EF community as a function of oligotype persistence in oyster EF samples. C) Oligotype persistence in oyster EF and water samples as a function of their persistence in water. D) The mean proportion of oyster EF and water bacterial communities as a function of oligotype persistence in water. Dotted line denotes regression trend line of the mean proportion of the water community as a function of oligotype persistence in water samples. E) The proportion of oligotypes observed in oyster EF and water samples grouped by their persistence. F) The persistence of oyster-associated (autochthonous) oligotypes, water-associated oligotypes, and non-associated (allochthonous) oligotypes in oyster EF and water samples. Letters denote statistically different groups (ANOVA, $p < 0.05$). Error bars are standard error.