

Supplementary Data

Table S1: Literature review of molecular environmental studies listing all studies. Number of stations refer to spatially separated sites. Single samples under sampling frequency category refer to samples taken at one point in time and space usually from a cruise. Sample replicate with same method means replicate samples processed in parallel throughout the analysis. Taxa listed only when sequencing was performed in the study. Abbreviations for methods: Fish-TSA: Fluorescence In Situ Hybridisation-Tyramide Signal Amplification, CARD-FISH: Catalyzed reporter deposition Fluorescence In Situ Hybridization, RFLP: Restriction Fragment Length Polymorphism, T-RFLP: Terminal Restriction Fragment Length Polymorphism, DGGE: Denaturing Gradient Gel Electrophoresis, TGGE: Temperature Gradient Gel Electrophoresis, SSCP: Single Strand Conformation Polymorphism, qPCR: quantitative PCR, PFGE: Pulse-Field Gel Electrophoresis, ARISA: Automated rRNA intergenic spacer analysis. High throughput sequencing methods are listed under massively parallel pyrotag sequencing, 454 pyrosequencing, metabarcoding. Clone library sequencing is a lower output sequencing method carried out by Sanger Sequencing method. Primers EukA and EukB (also referred to as Primer A and Primer B) refer to those developed by (Medlin *et al.*, 1988), 528F, 1055R by (Elwood, 1985), 18S-564R by (Amann, 1990), NS1 and NS, NS1 and NS2+GC by (Gao *et al.*, 2008) and ITS1 and ITS 2 by (White, 1990). All other primers citations are from studies already listed in supplementary Table 1.

Table S2: Responses to Questionnaire by CL (C. Lovejoy, Université Laval, Canada), BL (Bill Li, Bedford Institute of Oceanography, Canada), SBR (Natalie Simon, Daniel Vaultot, Fabrice Not: Station Biologique Roscoff, France), LAZ (Linda Amaral-Zettler, Marine Biological Laboratory, Massachusetts, USA and Brown University, Providence, USA), AW (A. Worden, Monterey Bay Aquarium Research Institute), RS (R.Siano, IFREMER, France) (R. Stern, SAHFOS, U.K. now Marine Biological Association), AWI- Hausgarten (K. Metfies, Alfred Wegener Institute, Hausgarten, Germany), XM (X. Morán, King Abdullah University of Science and Technology, Saudi Arabia), EB (Eileen Bresnan, Marine Scotland, Aberdeen, UK), Naples (Adriana Zingone, Marina Montesor, Wiebe Kooistra: Stazione Zoologica Naples, Italy), DW (D. Walsh, Concordia University, USA), DS (D. Scanlan, University of Warwick, U.K), JL (Julie Laroche, Dalhousie University, Canada)