Conference Abstract

Towards a standard protocol in coastal aquaculture biomonitoring: an interlaboratory study to assess reproducibility of the wet lab protocol and of Illumina sequencing

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Abstract

Salmon aquaculture is one of the fastest growing food sectors in the world. Because aquaculture can have a significant impact on the benthic environment, frequent monitoring is required by law. Recently, eDNA (environmental DNA) metabarcoding of benthic bacterial communities emerged as a very powerful tool to infer ecological quality based on amplicon sequence variants (ASVs) and their analyses. To exploit this monitoring approach and enable implementation into routine monitoring programs and official regulations, a high reproducibility of a standardized protocol among different laboratories is a prerequisite. Therefore, sediment samples from a compliance monitoring of a Scottish salmon farm were split into aliquots and distributed to two different laboratories for the wet lab procedure prior to independent Illumina sequencing of the two datasets. We then conducted pattern matching analyses and used supervised machine learning to predict ecological quality for each sample in the two datasets. Results were compared among the

two datasets and to the reference data (ecological quality status as obtained from traditional macrofauna-based benthic monitoring). The obtained results demonstrate the high degree of congruence between the ecological quality assessments from the two laboratories. We conclude that the standard wet lab protocol used in our study is sufficiently robust across different laboratories, which meets a milestone criterion for practical routine application in industry.

Keywords

aquaculture biomonitoring, interlaboratory, eDNA metabarcoding, pattern matching, supervised machine learning, robustness

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Presented at

1st DNAQUA International Conference (March 9-11, 2021)