

WHERE THE eDNA-BASED MARINE BENTHIC MONITORING CAN BE APPLIED?

Our Marine Benthic Monitoring test has been developed to carry out biodiversity surveys and bioassessment. It can be applied to environmental baseline studies and environmental impact assessment studies to meet environmental compliance and industrial needs.

HOW TO START?

If you are interested in applying the ID-Gene™ Marine Benthic Monitoring test to assess the environmental impact of your activity, please contact us and we will provide you with additional information and material necessary for samples collection and preservation.

WHAT WE OFFER?

- rapid service (processing time 2-4 weeks for 100 samples)
- high quality control
- competitive prices
- final report comprising values of selected biotic indices and a list of species for each sample

References

- Lejzerowicz F, Esling P, Pillet L, Wilding TA, Black KD, Pawlowski E. (2015) High-throughput sequencing and morphology perform equally well for benthic monitoring of marine ecosystems. *Sci Rep.* 2015 5:13932.
- Cordier T., Frontalini F., Cermakova K., Apothéoz-Perret-Gentil L., Treglia M., Scantamburlo E., Bonamin V., Pawlowski E. 2019. Multi-marker eDNA metabarcoding survey to assess the environmental impact of three offshore gas platforms in the North Adriatic Sea. *Marine Environmental Research* 146, 24-34.
- Pawlowski E, Esling P, Lejzerowicz F, Cordier T, Visco EA, Martins CIM, Kvalvik A, Staven K, Cedhagen T (2016) Benthic monitoring of salmon farms in Norway using foraminiferal metabarcoding. *Aquacult Environ Interact.* 8:371-386
- Pochon X, Wood SA, Keeley NB, Lejzerowicz F, Esling P, Drew E, Pawlowski E. (2015) Accurate assessment of the impact of salmon farming on benthic sediment enrichment using foraminiferal metabarcoding. *Mar Pollut Bull.* 100(1):370-82.

ID-Gene ecodiagnosics

Laboratoire
109 ch. du Pont-du-Centenaire,
1228 Plan-les-Ouates

Office
2a ch. des Hutins, 1232 Confignon
Geneva, Switzerland

Tel: +41 076 693 51 69
info@id-gene.com
www.id-gene.com

ID-Gene™ **MARINE BENTHIC MONITORING**

A new genetic tool for rapid and cost-effective assessment of industrial impacts on marine biodiversity

What is benthic monitoring?

Benthic monitoring is one of the standard procedures for environmental impact assessment of the marine industry. It consists in analysing changes in the benthic community of macro-invertebrates in relation to the environmental changes associated with industrial activities. The macro- invertebrates are classified in ecological categories that define their adaptation to different environmental conditions.

The abundance of each species, weighted by their ecological category is used to calculate the biological quality index. There are several indices that have been applied to marine benthic monitoring (AMBI, ITI, NSI, NQI1). The values of these indices determine the ecological status of benthic community and inform about the industrial impacts on marine biodiversity.

What is the eDNA test?

The environmental DNA (eDNA) test applied to marine environments consists in isolating DNA from sediment samples and analysing it in order to determine the composition of species community living in this environment. The DNA can be preserved in the environment either as free molecules or inside the living

organisms, or other biological material. The eDNA test allows identifying species using their unique DNA sequences and determine biotic indices based on species composition and diversity.

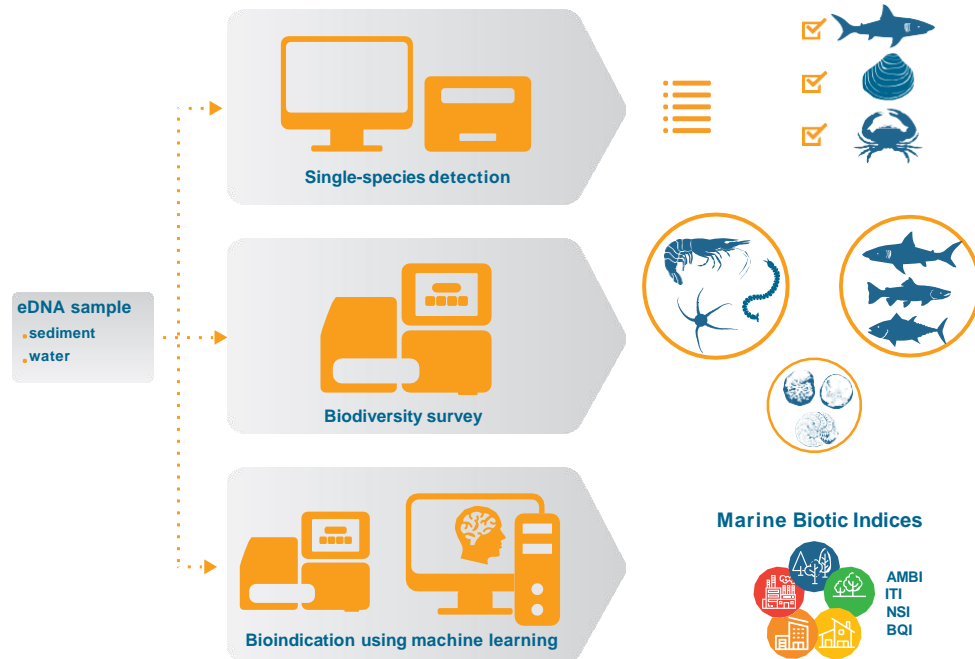
How does ID-Gene™ eDNA test enhance benthic monitoring?

Current benthic monitoring applied to marine industry is based on morphological identification and counting of manually sorted macro-invertebrates. This approach is time consuming and requires an excellent taxonomic expertise. The eDNA test offers a possibility to overcome these limitations by inferring species diversity from DNA sequences using standardized and automated protocols.

The additional advantages of eDNA-based benthic monitoring are

- i. it is more sensitive and accurate, by using wider range of bio-indicators and
- ii. it is less dependent on subjective morphological identification.
- iii. is rapide and cost-effective

HOW DOES ID-GENE™ eDNA-BASED MARINE BENTHIC MONITORING WORK?



HOW OUR eDNA TEST PERFORM COMPARED TO CONVENTIONAL MORPHO-TAXONOMIC APPROACH?

We calibrated our molecular method on conventional macrofaunal inventories to establish optimal compatibility between the eDNA test and the macrofauna-based ecological assessment. In addition to macro-invertebrates, we also target other taxonomic groups of benthic bio-indicators, that include meiofauna and microbiota (foraminifera, ciliates). The analysis of their DNA showed very good congruence with macrofauna studies, both in term of species richness and taxonomic composition. Finally, to account for the full biodiversity signal in the assessment, we calibrated our molecular methods with machine learning algorithms.

The cross-validation study conducted on more than 700 sediment samples collected in marine environments showed that our eDNA test was congruent with macrofauna assessment (see figures below). For the majority of samples, the ecological status was correctly assessed. Most of the remaining samples differ by one ecological status category.

