



Conference Abstract

Establishment of a national monitoring program based on environmental DNA for amphibians and the chytrid fungus *Batrachochytrium dendrobatidis*

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Abstract

National monitoring programs provide the basis for evaluating the integrity of ecosystems, their responses to disturbances, and the success of actions taken to conserve or recover biodiversity. In this study, we successfully established a national program for the invasive chytrid fungus *Batrachochytrium dendrobatidis* (Bd) based on dual TaqMan assays. Amphibian diversity based on metabarcoding of the mitochondrial 12S rRNA gene was also performed. Assays were optimized for sensitive detection of target species from a wide range of amphibian ponds with variable potential of inhibitions for eDNA based detection. An amphibian mock community of 5 species was used to validate the metabarcoding approach while internal standards were used in the case of the dual TaqMan assays. First sampling of over 170 ponds in Norway resulted in Bd detection in 12 environmental samples and one swab sample taken over multiple years indicating the establishment of Bd in Norway. Five amphibian species *Bufo bufo*, *Lissotriton vulgaris*, *Triturus cristatus*, *Rana arvalis* and *Rana temporaria* as predicted from data in long-term

citizen science reporting systems were widely detected in the collected eDNA samples. Our large scale-monitoring program indicates a low risk of a Bd outbreak and amphibian decline caused by chytridiomycosis but continued monitoring is recommended in the future. These findings indicate that eDNA is an effective method to detect invasive species, and to monitor endangered amphibian species. Still, several shortcomings (such as PCR inhibitors and sample volume) were identified that need to be addressed to improve eDNA-based monitoring at the national level.

Keywords

chytridiomycosis, TaqMan assay, metabarcoding

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Ethics and security

Amphibian samples were taken in compliance with the Norwegian law under a permit provided by the Norwegian Environment Agency

Conflicts of interest

The authors do not state any conflict of interest.