eDNA in seawater samples could reveal status of deepwater fish populations

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Redfish and Greenland Halibut. Credit: Peter Rask Møller

Environmental DNA in seawater samples may provide accurate information about deepwater fish populations, according to a study published November 16, 2016 in the open-access journal *PLOS ONE* by Philip Francis Thomsen from the Centre for GeoGenetics at the Danish Natural History Museum, University of Copenhagen, Denmark, and colleagues.

Fish in remote polar and deepwater habitats are threatened by climate change and increased fishing efforts, making it important to monitor populations. However, monitoring can be logistically difficult and currently depends on invasive techniques such as bottom trawling and unreliable reports of catches. Less invasive, more reliable monitoring techniques are therefore needed.

To address this need, Thomsen and colleagues assessed an alternative monitoring technique which relies on sequencing environmental DNA (eDNA) in seawater samples. They collected seawater samples at sites off Southwest Greenland, at varying depths between 188 and 918 meters, sequencing the DNA in these samples to determine the fish species present. They compared these results to catch data obtained by simultaneous trawling at each site.

Thomsen and colleagues found that data on fish biomass and abundance was correlated with eDNA sequence abundance. Twenty-six families of fish, including rays and halibut, were identified by both trawling and environmental DNA techniques, compared to just two families found only in trawling and three found only in eDNA. Environmental DNA sampling also detected a higher abundance of the Greenland Shark than trawling did, which may indicate that the technique can effectively detect large fish which may evade trawling nets.

Environmental DNA sampling will need to undergo further testing to determine its effectiveness as a monitoring technique. Nonetheless, the authors state their study demonstrates how eDNA could be used in non-invasive monitoring, for commercial fishing as well as to assess the impact of climate change on the biodiversity of these remote ecosystems.

More information: Thomsen PF, Møller PR, Sigsgaard EE, Knudsen SW, Jørgensen OA, Willerslev E (2016) Environmental DNA from Seawater Samples Correlate with Trawl Catches of Subarctic, Deepwater Fishes. *PLoS ONE* 11(11): e0165252. DOI: 10.1371/journal.pone.0165252