Environmental DNA effectively monitors aquatic species populations

December 9 2016

Environmental DNA (eDNA), the nuclear or mitochondrial DNA shed from an organism into its environment, is a rapidly evolving tool for monitoring the distribution of aquatic species. A new study published in *Transactions of the American Fisheries Society* discusses the ability of eDNA to accurately predict the presence, relative abundance, and biomass of wild Brook Trout (Salvelinus fontinalis) populations.

The study concluded that eDNA was an effective way to measure aquatic singles-species populations. eDNA correctly predicted the presence/absence of Brook Trout in 85.0 to 92.5 percent of the 40 streams where fish populations were surveyed.

The study's lead author, Barry Baldigo, a research biologist at the US Geological Survey's New York Water Science Center, said eDNA has become an increasingly important tool for quickly and accurately assessing biodiversity in aquatic habitats. The USGS, which provides unbiased scientific information to support the management of the United States' natural resources, is working to develop, improve and apply ecological monitoring methods like eDNA.

Populations of eastern brook trout, a native fish species highly sought after by anglers, have been decimated by acid rain in streams and lakes of the Adirondack Mountains where the study was conducted. The species is believed to be recovering in some areas as stream acidity declines, but confirming recovery in numerous sites across a large region using typical fish survey methods is costly and time consuming. Baldigo

and his colleagues were able to evaluate brook trout abundance in 40 streams using both eDNA and standard surveys. They showed that eDNA correctly characterized brook trout populations in 10 streams where they were absent, 10 streams where they were abundant, and another 20 streams were they were present in low or moderate densities.

Improvements in eDNA sampling and analysis methods over the past decade "have increased our ability to determine if a species is present or not, and its relative abundance, in aquatic habitats by analyzing a single water sample," said Baldigo. "The potential of this tool to characterize single and multiple species populations in aquatic and terrestrial habitats appears to be unlimited."

More information: Barry P. Baldigo et al. Efficacy of Environmental DNA to Detect and Quantify Brook Trout Populations in Headwater Streams of the Adirondack Mountains, New York, *Transactions of the American Fisheries Society* (2016). DOI: 10.1080/00028487.2016.1243578

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