



NS²
Nucleic Sensing Systems

Case Study: Presence and Absence of Targeted Species Decontamination Confirmation

The Problem:

The rapid detection of pathogens or species of concern is critical for many fields. Free environmental DNA (eDNA) is the best indicator of active biology from a species or pathogen of concern. Unlike typical environmental DNA (eDNA), free-eDNA is not associated with a cell. Thus, the lifetime of free-eDNA in the environment is short and must be tested immediately. However, Stabilizing eDNA uses costly chemicals, and there is no method to sufficiently separate it from chemical stabilizers. Therefore, free eDNA detection and quantification go undetected due to a lack of technology to accomplish timely execution.

Furthermore, it is widely believed that low quantities of a target biomolecule in the environment require a large sample volume (typically at least hundreds of milliliters) to be concentrated to ensure their detection. Thus, presence and absence detection, it is believed, must be an arduous task of sample collection and concentration.

The lifetime of a specie's eDNA in the environment is short. It must be tested for efficiently, quantitatively, and have immediate results to inform strategic actions.



The Solution:

The continuous-flow nature of the DNA-Tracker doesn't require sample staging and can provide an answer before short-lived molecules decay. In addition, the rapid degradation of free-eDNA can be seen as a benefit in many applications, such as any that need to know if the biological target was recently active.

The Tracker's continuous flow allows for the ongoing processing of samples. The Tracker can identify one target molecule in a five microliter sample and can detect multiple species in tandem with different genetic detection sensitivities. These capabilities enable setting a detection limit for a species at any desired level. Furthermore, by detecting free eDNA, the Tracker can most importantly confirm, in real-time, the presence and absence of a biologically active species or pathogen of concern.

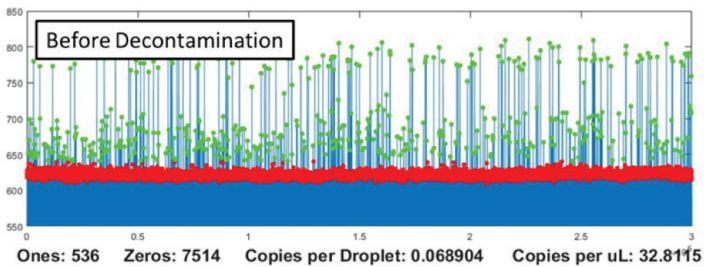




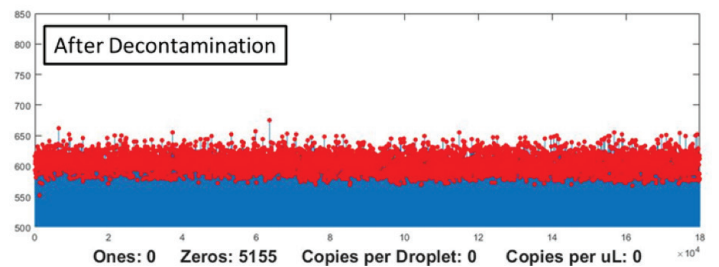
The Results:

Combining continuous flow with unlimited detection limits results in the ability to quickly and easily identify the presence of organisms in the field or verify decontamination. For example, the State of Montana has used the Tracker to confirm in-field decontamination of a targeted species on recreational boats and trailers. The Tracker is now ready to make a huge impact and provide answers to previously unanswerable but critical questions in defense, human health and safety, environmental health, ecology, and natural resource management.

Targeted Species Presence Detected



Targeted Species Absence Confirmed



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