Genome BritishColumbia
Leading ▸ Investing ▸ Connecting

Information Bulletin

eDNA

What is eDNA?

DNA left behind from living organisms that is collected from soil, water, snow, air and other environments. The DNA is matched with primers, acting as fingerprints to identify the species and determine what is living in that environment.

Primers and reference libraries can be created to detect more than just presence/absence; eDNA can also inform about contaminants, animal stress, biodiversity, and many other factors.

How is eDNA used?

eDNA enables the monitoring of wildlife in remote areas:

- Tracking migrating and dispersed species - tracking rare and highly dispersed species is costly, time-consuming and requires finding animals; eDNA allows for broader, more accurate testing regardless of animal presence
- Deep ocean applications also exist: we know more about the surface of the moon than we do about the ocean's floor; existing water column sampling can leverage eDNA sampling to map the ocean's floor for life

Mineral and hydrocarbon detection or "bioprospecting" also has potential through the application of eDNA. Bacteria living on mineral deposits can be used to map geological formations for minerals, metals and hydrocarbons. Bacteria which live on certain minerals and deposits can offer a 'map' to those deposits such as springs and oil wells.

eDNA can also be used as a tool or early warning system for pandemic diseases. One examples of this is avian flu: migrating birds can transmit the disease to domestic/farmed animals. Routine sampling of waterways and ponds where these wild water fowl congregate can be used to find the excreted virus. Rather than capturing a few birds and having narrow sample size, eDNA analysis of a water sample will give a much larger sample size.

What are the benefits of eDNA?

eDNA detection has been shown to be more sensitive than traditional Environmental Impact Assessments (EIA) methods which are required for large scale industrial projects, like mining and energy operations.

eDNA could also form an independent tool to replace existing EIAs or be used as a companion tool to existing remote sampling protocols to offer confidence to regulators and the public. This includes identifying areas for further exploration such as mineral deposits.

Determining the presence or absence of a target organism is useful, but eDNA methods go further in helping to quantify the prevalence or absence of a species in the environment with a relatively minor amount of disturbance to the ecosystem. eDNA also offers a critical advantage in the early detection of invasive species or pathogens that cause disease, and monitoring of endangered species1. By measuring the relative quantity of DNA, a, aquatic or wildlife regulatory body can determine if an invasive species population is growing or dwindling. eDNA tools can offer more objective, efficient, cost-efficient and timely

[1] Takahara, et al., 2013.

information, and reduce the time required to sample for aquatic and rare species.

What are the challenges of eDNA?

- Current applications of eDNA are not standardized and/or validated in the fields of application, and it is difficult to compare studies as well as get reproducible outcomes. The lack of maturity and prevalence of this tool is holding back its real time routine use
- eDNA sampling can be expensive to set up, though more common molecular tools like PCR are not
- As a technology, eDNA needs to build trust in the public realm and confidence for government and regulators and recognition through baseline research, side by side studies with conventional tools and a growing body of evidence of how and where to use it properly are needed

Visit **genomebc.ca** to learn more.

P0107.012 05/2018