Innovations in Field Studies for EAs / IA

With Advancing Technology - Are We Up to The Challenge?

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Overview

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1. Factors Driving Change & Innovation

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2. Advances in Technologies

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3. Data Collection Advantages / Challenges

4. Innovation Drivers & Approaches to Uncertainty

Are we up for the challenge?

Factors Driving Change & Innovation

Policy and Legislation

- *Migratory Birds Convention Act (MBCA)* - 2022
- O. Reg. 41/24 – *Conservation Authorities Act* - 2024
- Species at Risk - new and future species designations, *Endangered Species Act (ESA)* – 2007 & *Species at Risk Act (SAR)*
- Provincial Planning Statement (PPS), Regional and Municipal Official Plans - 2024
- *Environmental Assessment Act (EAA)* - 2024

Did You Know?

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Factors Driving Change & Innovation

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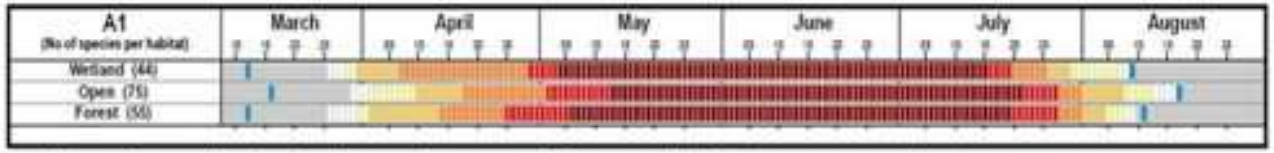
Climate Change, Species Adaptations, Invasive Species

- Guidance methodologies – updating and adaptive solutions
  - Marsh monitoring protocols
  - Amphibian surveys protocols
  - Fisheries and watercourse assessments
  - Headwater Drainage Features
  - Ecological Land Classification
  - Field season timing
  - Avoidance Windows

Example **Environment Canada – Regional nesting period**



Did You Know?

Figure 15—Tri-colored bat (*Perimyotis subflavus*) maternity colony located in suspended dead pine needles 20 m above the ground in a live 40-cm d.b.h. pine. (Photos by S. Andrew Carter, U.S. Forest Service)

Figure 4—Northern long-eared bat (*Myotis septentrionalis*) maternity colony (crevice near top of tree) in a 20-cm d.b.h. pine snag, located in a recently thinned and burned pine stand. (Photo by Roger W. Perry, U.S. Forest Service)

Factors Driving Change & Innovation

Evolving Project Objectives

- Project needs
- Timelines
- Number of approvals required
- Evolving and adaptive
- Often same outcome different approach
- Competing interests

Photo Credit – **Jeremy Bensette**

Photo Credit – Kim Laframboise

Factors Driving Change & Innovation

Costs & Budget

- Planning and Design
- Stakeholders
- Consultants
- Agency Reviews
- Collaboration

Advancing Technologies

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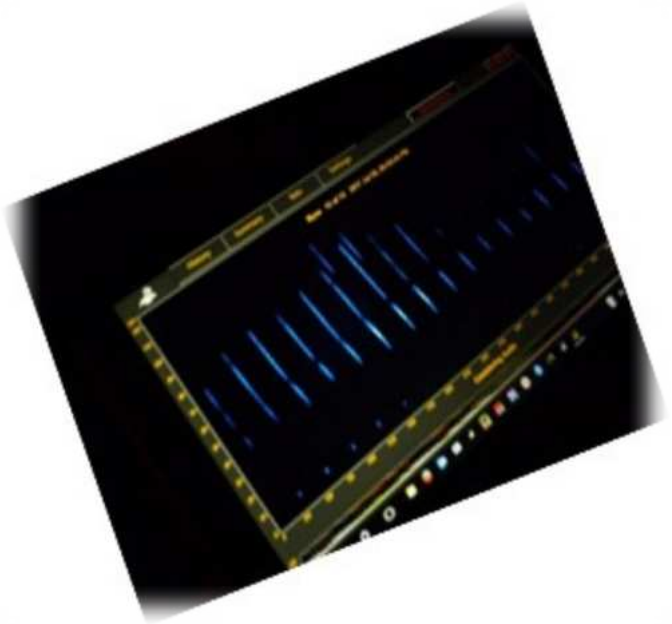

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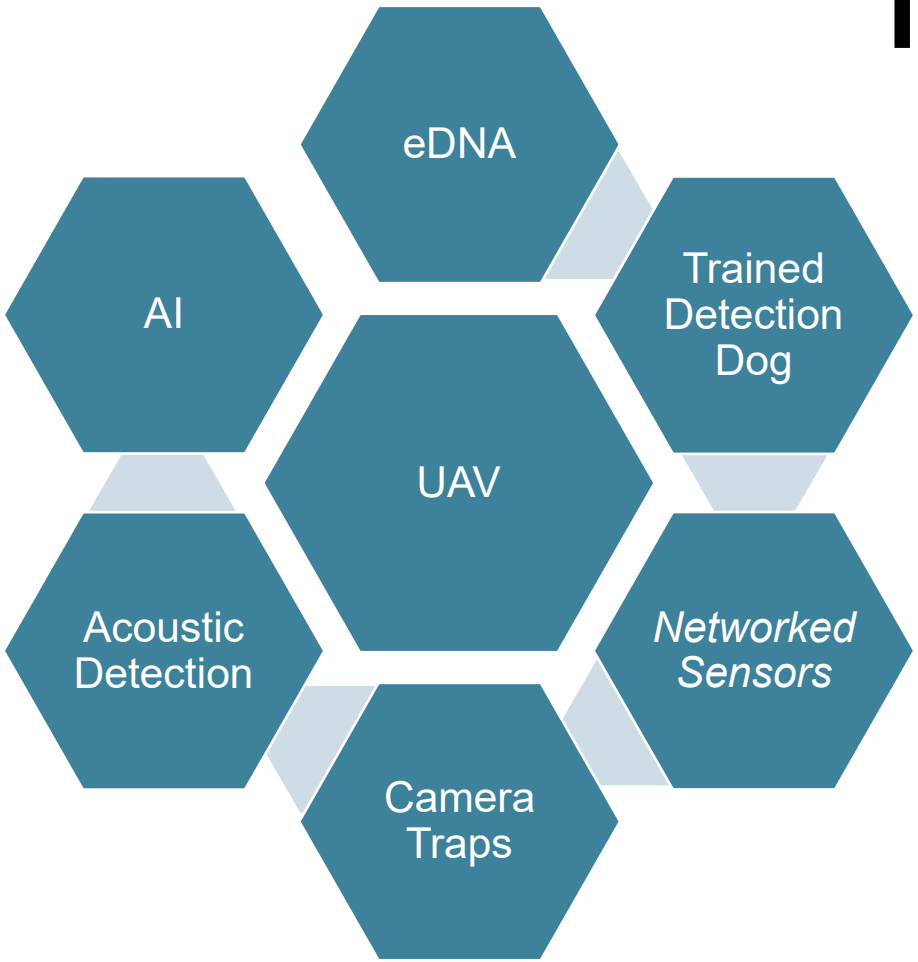
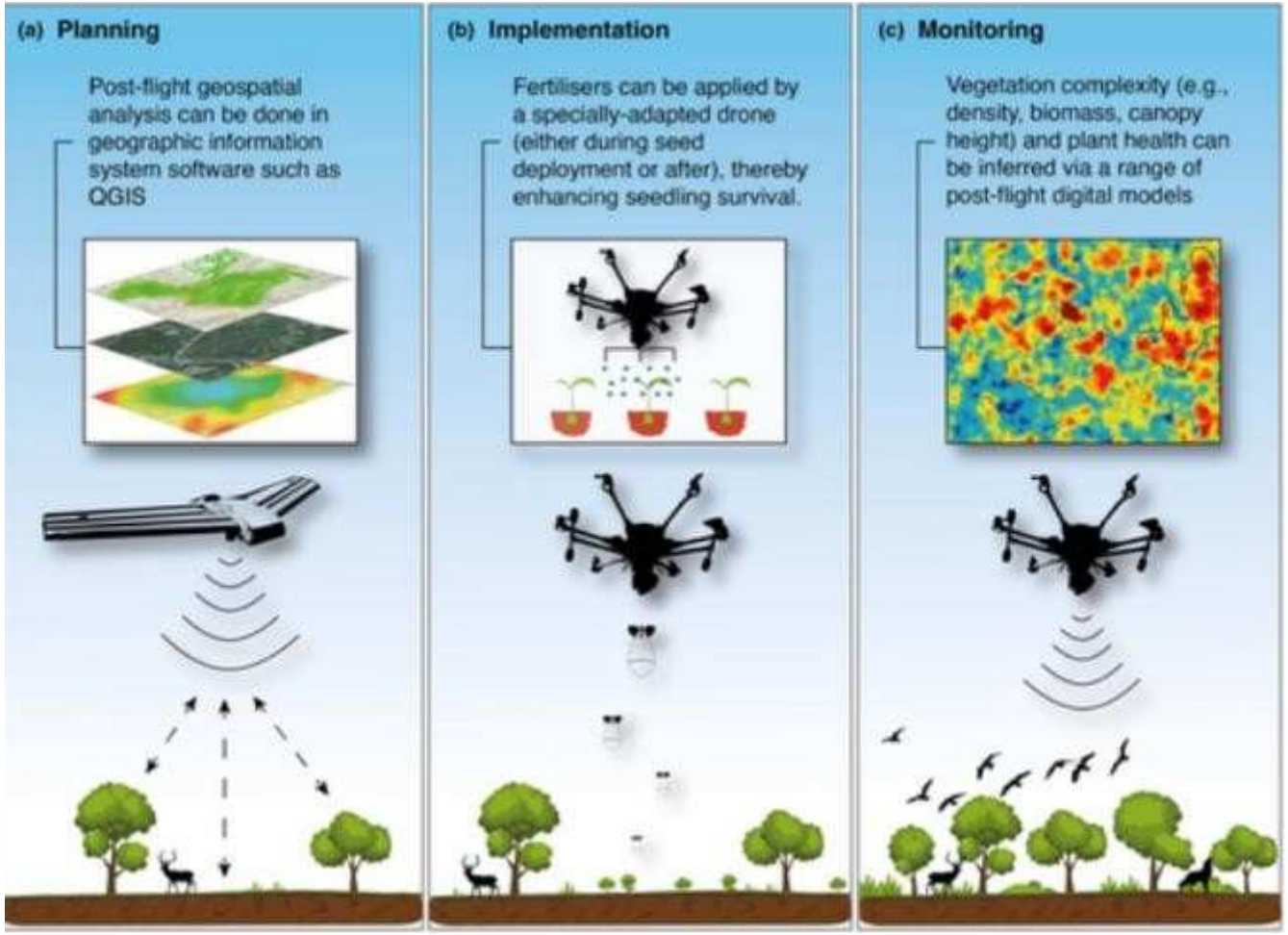


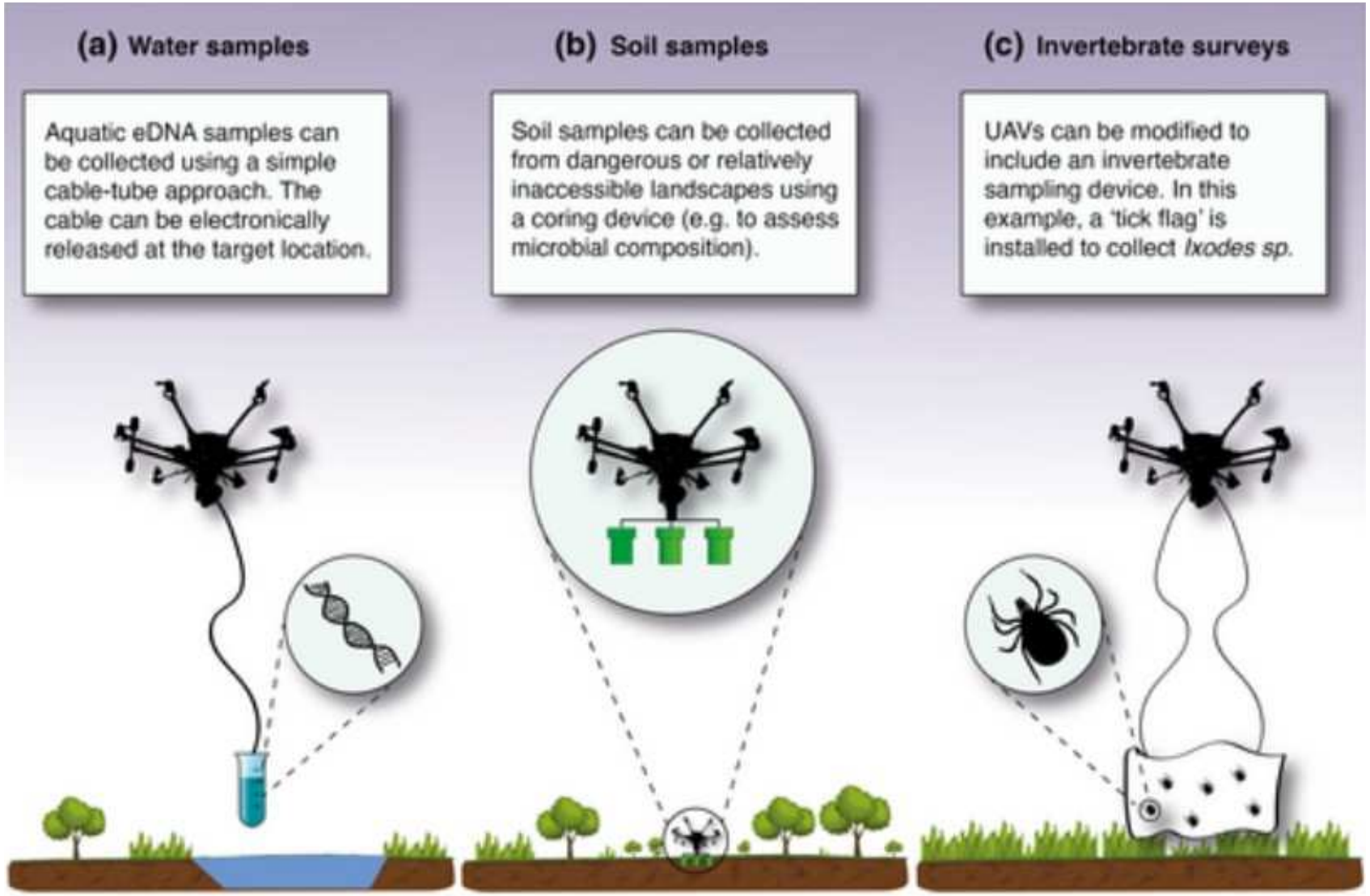
Photo Credit – HDR

Unmanned Aerial Vehicle (UAV)



- Not your average drone
  - Rapidly advanced over the last decade and are now primed to help tackle the complexities of ecological field evaluation
  - Hodgson et al., 2018; Jiménez López & Mulero-Pázmány, 2019 highlighted the versatility of drones has positively impacted several fields, including environmental management, conservation biology, and agriculture.

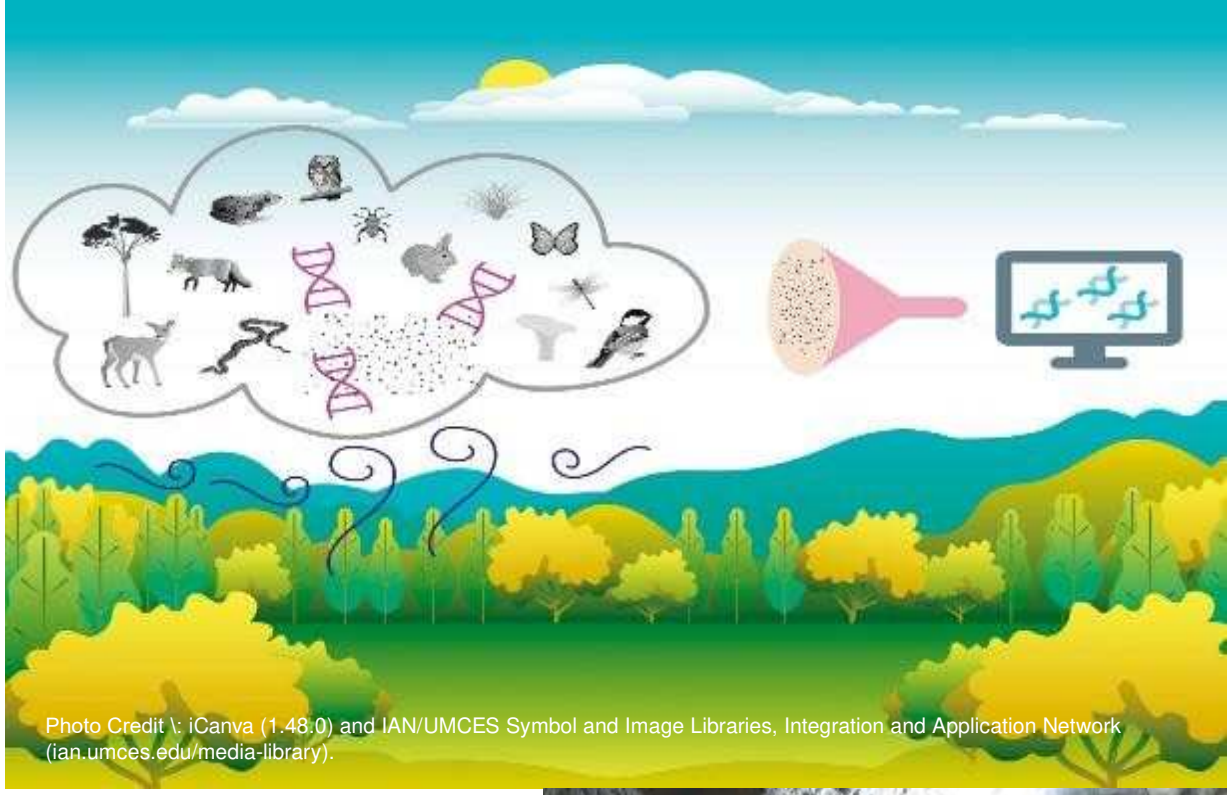
Unmanned Aerial Vehicle (UAV)



Environmental DNA (eDNA)

Non-invasive species detection

- Novel approach to biodiversity
- Relies on the genetic material shed (skin cells, feces, or mucus) by organisms into their environment
- Several methods soil, water, or air
- Water has been typical focus (relative ease of use and implementation) with new advancements in soil and air
- eDNA from wildlife tracks in the snow/mud.



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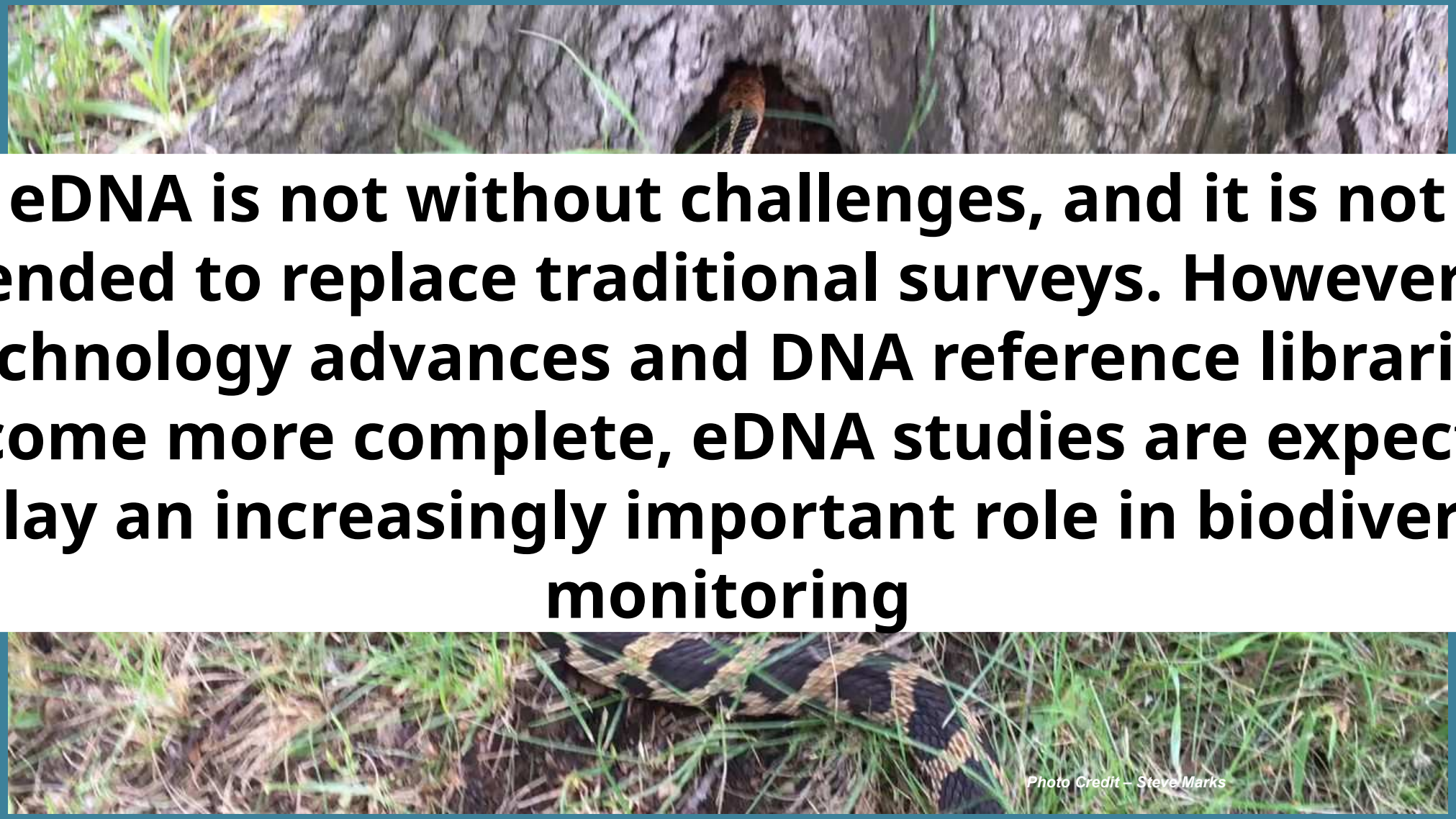

eDNA is not without challenges, and it is not intended to replace traditional surveys. However, as technology advances and DNA reference libraries become more complete, eDNA studies are expected to play an increasingly important role in biodiversity monitoring

Photo Credit – Steve Marks

Acoustic Analysis

- Utilizes acoustic sensors to detect and record sounds from wildlife and the surrounding environment
- Increasing used in a variety of applications (passive and active)
- Not just for bats, birds, amphibians, marine
- Insects, fish
- Passive use often underutilized

Photo Credit – Cory Olson

Photo Credit – Kim Laframboise

Photo Credit: *HDR* - Innovative Cultural Resources Solution Featured in Railway Track & Structures

Photo Credit – Melaine Whalen

Detection Dogs

Archaeology

Cadaver dogs and ground-penetrating radar, a cutting-edge tool to detect even ancient burial sites

Bat Roost (Summer / Winter)

Alaska Department of Fish and Game using dogs for detecting hibernacula for over 7 years to detect Little Myotis

Network Sensors/Camera Traps & AI to Improve Ecological Data Collection

- Deploying sensors of various types – for example of alarm system, vehicle/gate trackers (people, animals)
- Used to analyze large amounts of conservation data, such as camera trap, satellite and drone images or audio and video recordings
- E.g. wildlife facial recognition, wildlife crossings where camera traps are limited
- AI-driven systems provide real-time monitoring and response capabilities

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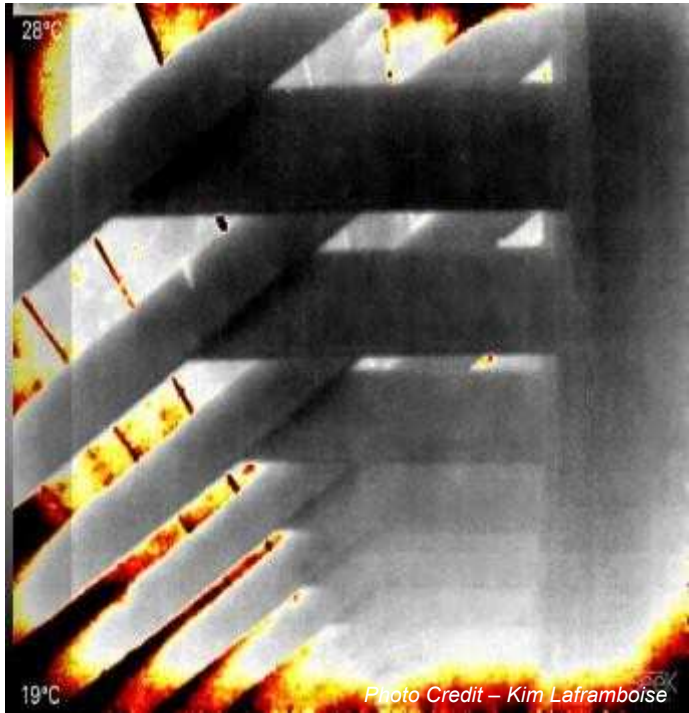

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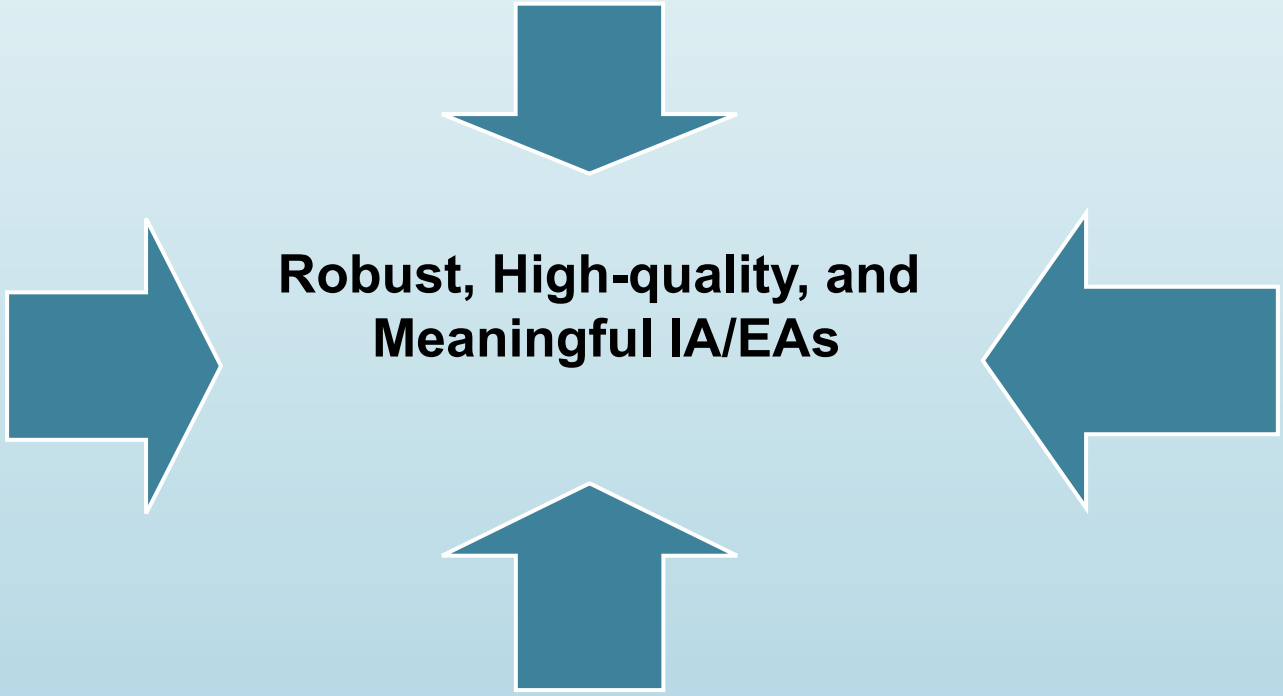
Innovative Technologies (Ecological Field Studies)

Technology's ability to enhance our data collection is not just a novel idea or “cool” tool to test out; it is a critical necessity moving forward



Preconceived ideas of cost. “Old School” is not always cheaper (up front costs / verse long-term gains)

Considerable potential to improve the science and reduce uncertainties

Maximizing outcomes and minimize impacts on Indigenous culture and traditions, health and socio-economic conditions, as well as archaeology, paleontology and the biophysical environment

Data Collection Advantages

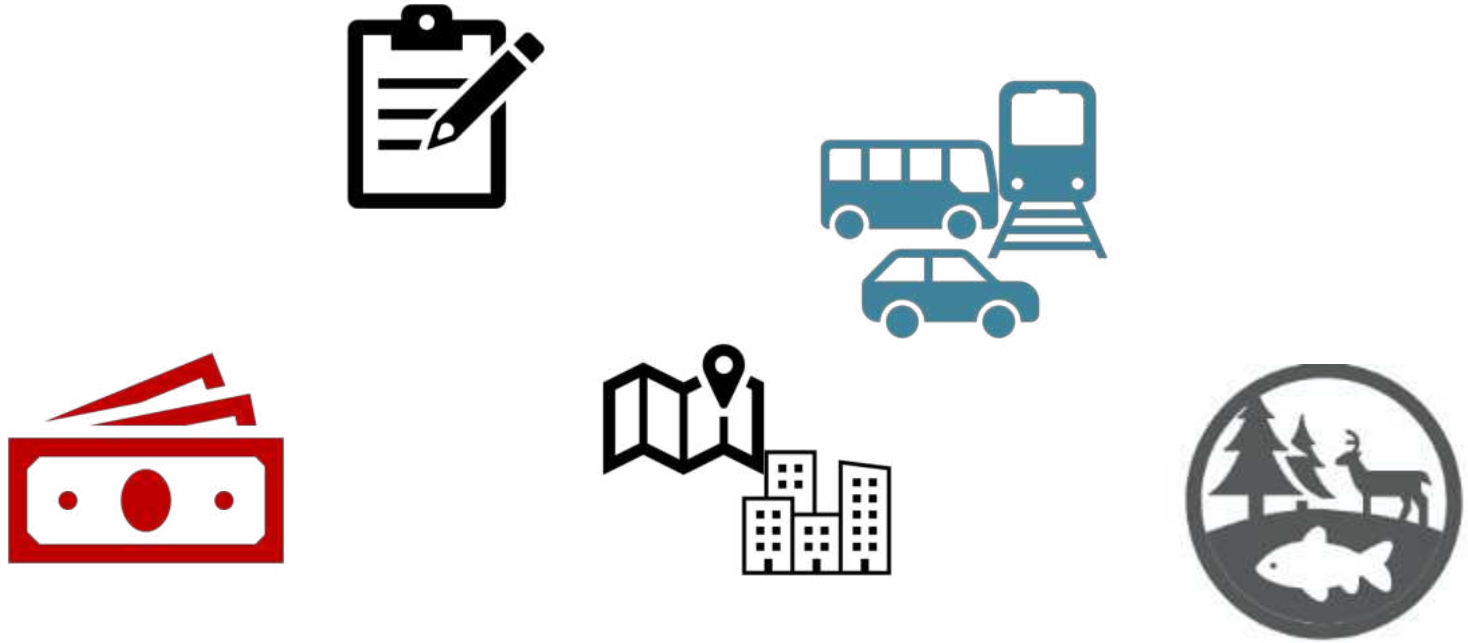
- Innovative field data collection allows us to be more efficient, informed, and transparent through the EA/IA process
- Scoping programs and collecting meaningful data rather than collecting information for information's sake
- Costs are not as expensive as you may think (factoring in PTE, staffing needs, H&S, etc.)
- Species and vegetation seasonal restrictions and timing – especially when considering Climate Change & species adaptations (or lack of)
- Increase sharing and usability between ecologists and stakeholders
- Reduction of Human Error: innovation can minimize the risk of mistakes as part of traditional data collection methods and analysis, enhancing accuracy and reducing uncertainty
- Engage earlier and more effectively

Data Collection Challenges

- Considering the speed of technological advancement and the rising need for cost-effective & rapid response, guidance is needed to effectively use recent innovations on the ground.
- Up front costs and investments in equipment / training
- Standardization - build trusted relationships
- Technology is out pacing existing guidance methods (being behind the times)
- Education - being innovative often comes with hesitancy

Innovation Drivers & Approaches to Uncertainty

How Does The Practitioner Decide?
Different Projects In Different Contexts



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Are We Up for the Challenge?

- Regulators/ Review Agencies – e.g. Local Conservation Authorities, MNRF, MECP, MTO, etc.,
  - Update existing guidance to allow for innovation
- Ecologists/Biologist, Practitioners & Specialists
  - Trained knowledge experts
- Public and Stakeholders
- Indigenous groups
- Regional and Municipal Level Planning Teams
  - Education, cost benefits, meaningful engagement

Brown Long Eared Bat, Toby J. Thorn (Toronto Zoo)

Prioritizing Information and Asking the Right Questions!

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