



Report Partner Document

PROJECT SUMMARY, MILESTONES, PAYMENT SCHEDULE AND QUARTERLY
UPDATE REPORTS Q1 2024/25

PTAC

This partner document has been created to provide a non-technical summary of information presented in *Project Summary, Milestones, Payment Schedule and Quarterly Update Reports Q1 2024/25* for the project entitled *Enhancing auto-recognition technologies and data management practices within the open environmental sensor platform, WildTrax* (2024) referred to in this document as “The Report”, prepared by lead investigator Dr. Erin Bayne for and with funding by Petroleum Technology Alliance Canada (PTAC) and Environment and Climate Change Canada (ECCC). Additional background information is provided in this partner document to supplement the readers understanding of progress presented in The Report.

Introduction

WildTrax is a powerful, open-access environmental data platform developed and maintained by the Alberta Biodiversity Monitoring Institute (ABMI). It serves as a centralized hub for managing and analyzing data collected from autonomous recording units (ARUs) and remote cameras. These sensors are revolutionizing how we monitor wildlife and ecosystems. Through intuitive tools, standardized workflows, and collaborative features, WildTrax helps researchers, regulators, conservationists, and industry teams collect, share, and interpret environmental sensor data cross Alberta and beyond. WildTrax is built to enable long term ecological monitoring by providing digital infrastructure that supports everything from raw data upload to species recognition and data visualization. The platform’s value lies not only in its technical capabilities but also in its openness, which invites collaboration and shared learning across a wide range of environmental stakeholders.

The Report provides a final summary for project 23-ERPC-03, funded in part by PTAC and ECCC and led by Dr. Erin Bayne, outlines a successful effort to enhance WildTrax’s functionality, particularly around automated species recognition and data management.

Background Information

Wildlife monitoring is the systematic collection of data on species and their habitats to understand trends, health, and changes in biodiversity. It plays a critical role in regulatory compliance by ensuring that industrial activities meet environmental standards; guiding conservation activities including habitat protection and restoration efforts; as well as research and innovation where wildlife monitoring is used to support ecological science and management decisions.

Traditionally, this work has been conducted manually, often by scientists in the field. In the past decade, however, Alberta has seen a transformative shift towards using autonomous sensors, such as ARUs and remote cameras. These tools allow for continuous and scalable data collection across large areas and time spans, enabling researchers to generate large data sets that were previously unimaginable. This shift has created a new challenge surrounding how we manage, analyze, and share large volumes of sensor data efficiently and ethically. An open platform, such as WildTrax, become crucial to address this challenge.

An open platform refers to a system that allows data and tools to be used, modified, and shared by a broad community of users. This openness encourages standardization, making data comparable across projects and regions. It promotes transparency and trust around wildlife monitoring and data analysis. Additionally, it fosters collaborative research, where data collected by one part can be valuable to others, while also reducing duplication of effort, saving both time and money. WildTrax exemplifies these values by making data more accessible and workflows more consistent, ultimately improving environmental decision making across sectors.

Project Summary

The Enhancing auto-recognition technologies and data management practices within the open environmental sensor platform, WildTrax project receive \$92,000 in PTAC funding, with an additional \$119,000 from other sources including ECCC, ABMI, the Environmental Protection Agency (EPA), Parks Canada, and Innotech Alberta.

Several key accomplishments were made to improve the functionality of WildTrax as part of this project. A summary is presented below. Despite some delays related to hiring and interface redesign, the project maintained alignment with its budget and deliverables. All major tasks were completed.

Single species Recognizer (SSRs)

Two deep-learning recognizers were developed for Ovenbirds and Common Nighthawks, two priority indicator species in Alberta. These recognizers detect species from acoustic records and estimate the distance of the animal from the recording device using updated models based on Yip et al. (2019). This advancement provides special context to species detections, which is critical for estimating animal density and habitat use.

These tools were integrated into WildTrax and made publicly accessible via ABMI's GitHub repository, enabling reproducibility and open access.

Multi-species Recognizer (MSRs)

A tool called HawkEars, developed and tested with support from ABMI, outperformed existing tools in identifying a variety of bird species from audio recordings and has been successfully integrated into WildTrax. A peer-reviewed manuscript describing HawkEars has been submitted, underscoring the project's scientific merit and commitment to transparent publication.

Remote Camera Auto-Tags

The project developed and implemented two new automated camera image tagging systems using MegaDetector and the newly introduced MegaClassifier v0.1. These tools can identify common species like elk and deer, as well as detect objects like vehicles and humans. This dramatically reduces the time and labour required for manual data processing.

The team refined the MegaDetector workflow to minimize false positives, further improving data quality and processing speed. Accuracy testing tools were also developed in R to support ongoing validation and use.

Open Bat Call Library

A curated, public library of bat echolocation clips was created using contributions from the Bioacoustic Unit and is now publicly available through WildTrax. This Bat Hub will support ongoing and future development of bat-specific auto-recognizers and enhance public access to rare acoustic data for research and conservation purposes.

Data Management Improvements

New features allow users to upload protocol documents directly into project. The visit metadata form has been updated to improve syncing between visit and equipment data and now supports North American Bat Monitoring Program (NABat) relevant metadata fields. A new function to assign GRT IDs, which are used for spatially balanced sampling (particularly for bats), was implemented using custom R

code that calculates IDs from GPS coordinates. A standardized NABat data export tool was also created to ensure compatibility with international data sets.

Sensor Expansion Planning

To prepare for broader sensor integration, the team prepared a scoping document evaluating the addition of temperature sensors and other environmental devices into WildTrax. This foundational work will guide future expansion of the platform's capabilities.

Conclusion

WildTrax represents a major evolution in environmental monitoring to meet the demands of modern data collection, analysis, and collaboration. The platform's ongoing enhancements through projects like the one detailed in The Report demonstrates its value as a shared environmental infrastructure for Alberta and beyond.

By making environmental sector data more accessible, accurate, and actionable, WildTrax empowers stakeholders across sectors to make evidence-based decisions that support conservation, regulatory compliance, and ecological stewardship. With continuous investment and development, WildTrax is well-positioned to become a cornerstone of biodiversity monitoring in Canada and a model for similar initiatives around the world.