
Monitoring Rare Animals in Alberta's Boreal Forest



Sometimes, monitoring biodiversity is a giant game of hide and seek. Some species are rare. Others are elusive. In either case, they can be extremely difficult to monitor.

The Alberta Biodiversity Monitoring Institute (ABMI)'s core biodiversity monitoring program is designed to track changes in groups of common plants and animals to understand how their populations might be changing over time. The program wasn't optimized for rare or elusive species. That's where the ABMI's Rare Animals project comes in.

Established in 2010, the goal of the ABMI Rare Animals project is to design cost-efficient protocols to monitor Alberta's rare and elusive vocalizing species—species that make sounds. To do this, the project makes use of an innovative new monitoring technology, the automated recording unit (ARU).

WHY ARUs?

ARUs are sound recorders that can be deployed at remote locations and programmed to record at set time intervals from weeks to months—even up to a year—in a variety of different habitats. As a result, ARUs are an ideal tool to monitor rare and elusive vocalizing species—a group that includes many at-risk species—and address a variety of biological questions associated with them, such as:

- **Owls:** How do varying levels of industrial noise affect owl distributions, their vocal communication, and hunting efficiency?
- **Amphibians:** What types of wetland habitat are being used by different amphibian species?
- **Yellow Rail:** What types of wetland habitat does the Yellow Rail (a secretive marsh bird and a species of Special Concern¹ in Canada) rely on?

Pilot fieldwork quickly demonstrated that ARUs effectively record the calls of an impressive number (170) of acoustic species simultaneously—both common and rare.

As a result of this versatility, ARUs are poised to change the business of acoustic monitoring in Alberta.



¹ Threat categories for species at risk as identified by the Government of Canada and/or the Government of Alberta.

BENEFITS OF ARUs:

Increased Species Detection: Because ARUs can be left in the field for extended periods and programmed to record anytime, protocols using ARUs provide more accurate estimates of total species number.

More Accurate Data: In contrast to using humans to make species identifications, ARUs provide a permanent record of data which facilitates more accurate species identifications. Recordings can be paused to “look up” unusual sounds and can be verified by experts, which permits analysts to correct for differences between observers, and even opens up the possibility of crowd-sourcing.

Additional Data Collection: ARUs can record enormous amounts of data. In one field season alone, the Rare Animals project collected 25 terabytes of sound data using ARUs—that’s over 2.5 years of continuous sound files! As a result, Alberta ecologists have access to an unprecedented amount of high-quality data on the abundance and location of 170 species of birds, amphibians, and other wildlife.

Computer Based Processing: Automatic sound recognition software has been developed for the Barred Owl and Yellow Rail so that recordings can be searched for “hits” of these target species. In 2013, this recognizer resulted in an almost two-fold increase in the number of Yellow Rails than had ever been detected before in the Lower Athabasca. Further advances in automatic song recognition will improve the efficiency of this monitoring technology.


Methodological Standardization: The Rare Animals project team is working with the ABMI and individual energy companies to integrate ARUs into current monitoring practices and standardize methods across agencies. Standardized methodologies will allow datasets to be pooled and compared between agencies. Advances in data analytics will vastly improve our state of knowledge of acoustic species in a region.

Safety: By limiting the need to send field technicians out at night in often very wet environments to collect similar data, ARUs reduce safety and logistical concerns associated with traditional survey methods.



ORGANIZATIONS USING ARUs:

- *The ABMI piloted the use of ARUs at eight ABMI core monitoring sites in 2013 and six sites in 2014, and is in the process of transitioning to using ARUs at all 1656 sites in the ABMI’s provincial monitoring network.*
- *ARUs have been used in seven on-lease acoustic monitoring programs throughout the Lower Athabasca (four surface mine operations and three in situ operations) since 2013.*
- *Fort Chipewyan’s community-based monitoring program undertook a pilot project using ARUs in 2013.*
- *University of Alberta researchers have deployed ARUs at thousands of locations since 2012 to better understand the distribution and habitat requirements of the project’s target species: owls, amphibians, and the Yellow Rail.*



Yellow Rail: A Case Study in ARU Application: The Yellow Rail is a small, secretive marsh bird that is primarily active at night. Prior to 2013, little was known about these birds—they're hard to find!—although they'd been reported in marshes and wet meadows in both prairie and forested habitats. The Yellow Rail is a species of Special Concern in Canada and a monitoring priority for the ABMI Rare Animals Project. Beginning in 2013, ARUs were used in a targeted monitoring program focused on exploring wetlands where Yellow Rail were expected to live. In the first year alone, this targeted effort combined with the use of automatic song recognition analyses resulted in the identification of 60 new locations with confirmed Yellow Rail occurrences. Using this data, we've learned that Yellow Rails have a preference for graminoid fens and meadow marshes with a water depth between 0-20 cm. And, because ARUs record all other vocalizing species in the area simultaneously, we have information on other species, such as the rare Sedge Wren, that are often found in the same habitat as the Yellow Rail.

ARU-based monitoring protocols demonstrate how companies can ensure they're meeting regulatory requirements for their operations by, for example, indicating whether a proposed project is operating on known Yellow Rail habitat.



APPLICATIONS OF ARUs:

ARUs can be used to address a number of management questions related to acoustic species. Examples of ARU applications include:

- **Species at risk monitoring and mitigation programs:** Many organizations and land managers are interested in where at-risk or rare species are found and how best to minimize impacts on these species. ARUs have proven successful at providing data on a long list of rare vocalizing species, such as the Barred Owl, Canada Toad, Yellow Rail, Rusty Blackbird, and Common Nighthawk.
- **Reclamation planning and reporting:** ARUs can be used to document reclamation progress at a reclaimed industrial site by tracking the return of vocalizing species to the site.
- **Lease-level census:** ARUs can be systematically deployed throughout a township or lease land to conduct a more accurate species population census than can be achieved through localized surveys. This approach allows researchers to evaluate how the population is responding to particular activities on the landscape. Because this type of survey can be nested within the systematic grid used by the ABMI core monitoring program, it could also feed into regional species monitoring efforts and potentially support species abundance trend estimation at the lease scale.



MOVING FORWARD:

Currently, the ABMI is in the process of transitioning to using ARUs at all of its monitoring sites.

Based on the accumulated expertise and capacity in the use of ARUs developed through the Rare Animals Project, the ABMI and the University of Alberta plan to launch the Acoustic Monitoring Centre. The Centre will be a hub for acoustic recording analysis and storage available to anyone interested in understanding the occurrence and behaviour of vocalizing species in Alberta. ARUs and other technological tools are revolutionizing how we conduct wildlife monitoring and research. This data can improve our ability to support informed land-use decisions for the future of all Albertans. Stay tuned...

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The ABMI's Rare Animals Project was originally conceived and initiated through the Ecological Monitoring Committee of the Lower Athabasca (EMCLA). The EMCLA, a consortium of oil sands companies, government ministries and agencies coordinated by the ABMI, was established in 2010 with the goal of designing protocols to monitor rare and elusive species.

Visit www.emcla.ca for more information.

PHOTO CREDITS

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