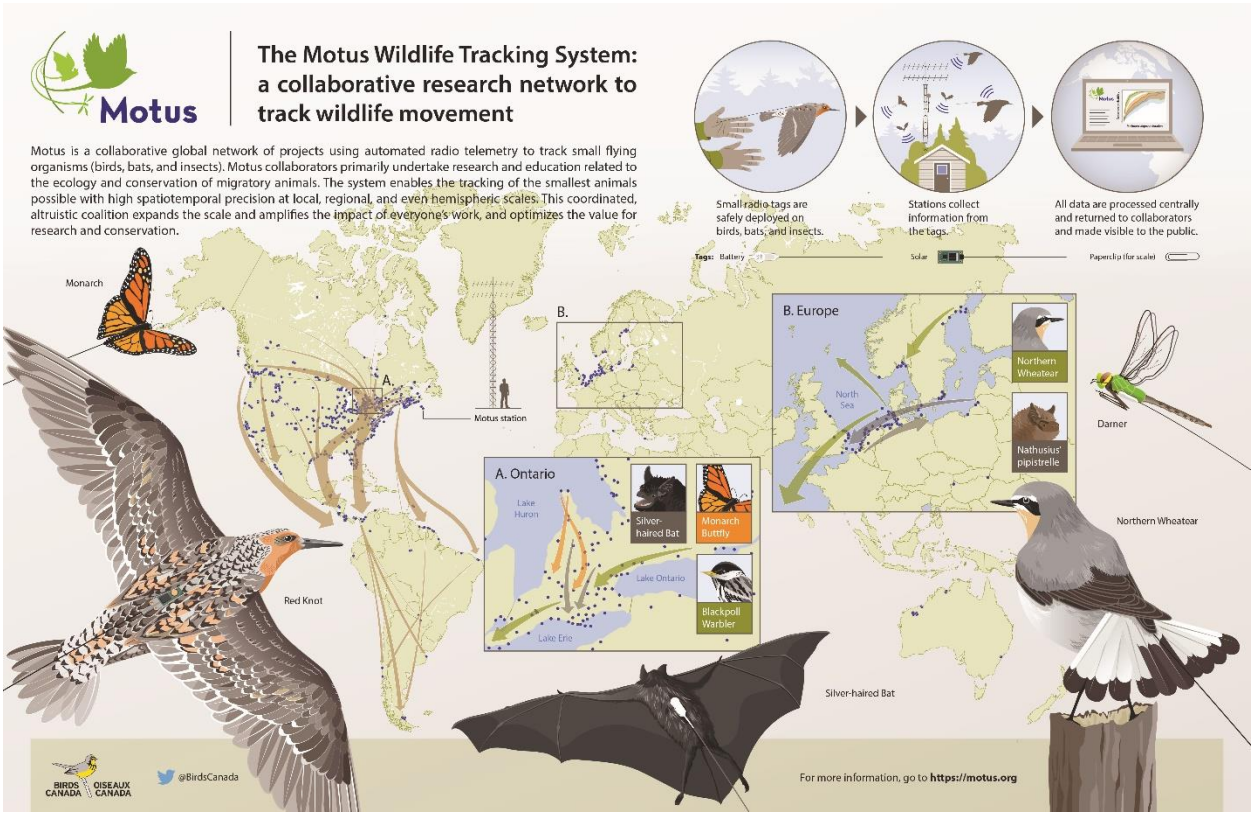
Hosting a Motus Wildlife Tracking System Station



The Motus Wildlife Tracking System. Read the research paper at http://www.ace-eco.org/vol12/iss1/art8/.

Understanding the movement patterns of animals is an essential part of developing conservation strategies and implementing conservation actions where they are most needed. Migration ecology helps us determine where to direct limited resources, and the natural phenomenon of migration inspires and connects us across communities and continents in conservation and education. The Motus Wildlife Tracking System (*Motus* is Latin for movement) is a collaborative research network dedicated to studying the movement and behaviour of small flying animals. Motus is a program of Birds Canada, a non-profit organization dedicated to bird and habitat conservation, in partnership with many collaborating researchers and organizations. Motus uses coordinated automated radio-telemetry arrays with receiver stations distributed across the landscape that detect animals marked with uniquely coded radio-transmitters by various researchers.

A Red Knot is released carrying a radio-transmitter. The transmitter antenna can be seen extending from the back and over the tail of the bird. Photo: Yves Aubry

The biggest strength of Motus is its collaborative nature. Currently, it comprises over 1500 stations in 34 countries managed by over 1500 partners and collaborators. Over 37 000 animals have been tracked—mostly birds, but also bats and insects—and Motus data have been used in over 150 publications. The data are housed in Birds Canada's National Data Centre and presented to the public via the Motus website (www.motus.org).

Birds Canada collaborates with many partners who host Motus stations. Generally, Motus stations include antennas connected to receiver hardware, plus the infrastructure needed to elevate antennas and power the station. Stations that build off existing infrastructure and can access standard electric supply tend to be less expensive than freestanding towers that rely on solar power. The beauty of hosting a Motus station is that you can support many projects simultaneously, sometimes without even knowing, because the stations are designed to detect tagged animals across all projects that use Motus. One station could contribute to both a study of local movements of overwintering sparrows and a study of hemispheric shorebird migration, among others. Recent research using Motus has revealed the importance of stopover habitat in northern Colombia for migrating Gray-cheeked Thrushes and the negative impacts of neonicotinoid insecticides on White-crowned Sparrow body weight and migration.

Motus station antennas mounted on a tower bracketed to a building. Photo: Northeast Motus Collaboration

The Motus Wildlife Tracking System is one of the largest migratory animal conservation science initiatives in the world. Through its collaborative efforts and use of resources, Motus is well positioned to translate science into conservation action that maximizes benefits to highly mobile animals.

Hosting a Motus station

A Motus station can provide opportunities to be part of an international network studying the ecology and conservation of migratory animals. Motus can also offer educational opportunities for students from elementary to university. The structure of a Motus station can be flexible and adapted to meet the needs of the host and site, from temporary mini stations to long-term standalone pop-up towers to long-term building co-locations.

Parts specifications

Antennas: A mini-Motus station includes a single omnidirectional antenna (Maple Leaf J166R) that is a 1.39 m rod mounted vertically. A long-term Motus station can include two 5-element or 9-element Yagi antennas (Maple Leaf 5E166/Maple Leaf 9E166) and one or two 6-element Yagi antennas (Laird YS4306). The 5-element antennas are 1.91 m long, the 9-element antennas are

3.46 m long, and the 6-element antennas are 1.12 m long. These antennas will not transmit signals at any frequencies—they will simply monitor for animals in the area carrying tags that emit uniquely coded pulses. The omnidirectional, 5-element and 9-element antennas detect Lotek nanotags that transmit at 166.38 MHz and the 6-element antennas detect Cellular Tracking Technologies LifeTags that transmit at 434 MHz (approved frequencies).

Mounting structure: We can work with the station host to determine a safe and suitable location and mounting structure for the Motus station. For temporary mini-Motus stations, the antenna is mounted on a painter's pole. For long-term stations, it could be a building co-location (preferred) where antennas are mounted on a mast attached to the side of a building or a railing, on a flat roof, or on other existing infrastructure at the site, or a standalone pop-up tower stabilized with guy lines. See below for photos of example Motus stations.

Receiver: Detections of tagged animals will be logged using a SensorStation receiver (Cellular Tracking Technologies). Antennas are connected to the receiver with coaxial cables. The receiver could be mounted outdoors on the mounting structure in a waterproof case or indoors. The SensorStation receiver plugs into standard 120V AC power supply and power consumption is approximately 5-10 W. Solar power is also an option. SensorStation receivers can connect to the 4G cell network or wifi to enable real-time data download to the Motus server, so that any data collected by the Motus station is then uploaded to the Motus website automatically and relatively quickly. If cell service or wifi is not available, data can be manually downloaded periodically.

Installation

Birds Canada staff can do the station installation with assistance from the site host or other professionals if needed to ensure the installation meets the site's requirements and the host's expectations.

Data sharing

Detections of tagged animals and the dates of these detections can be shared with the Motus station host. These data are also available on the Motus website.

Contact information

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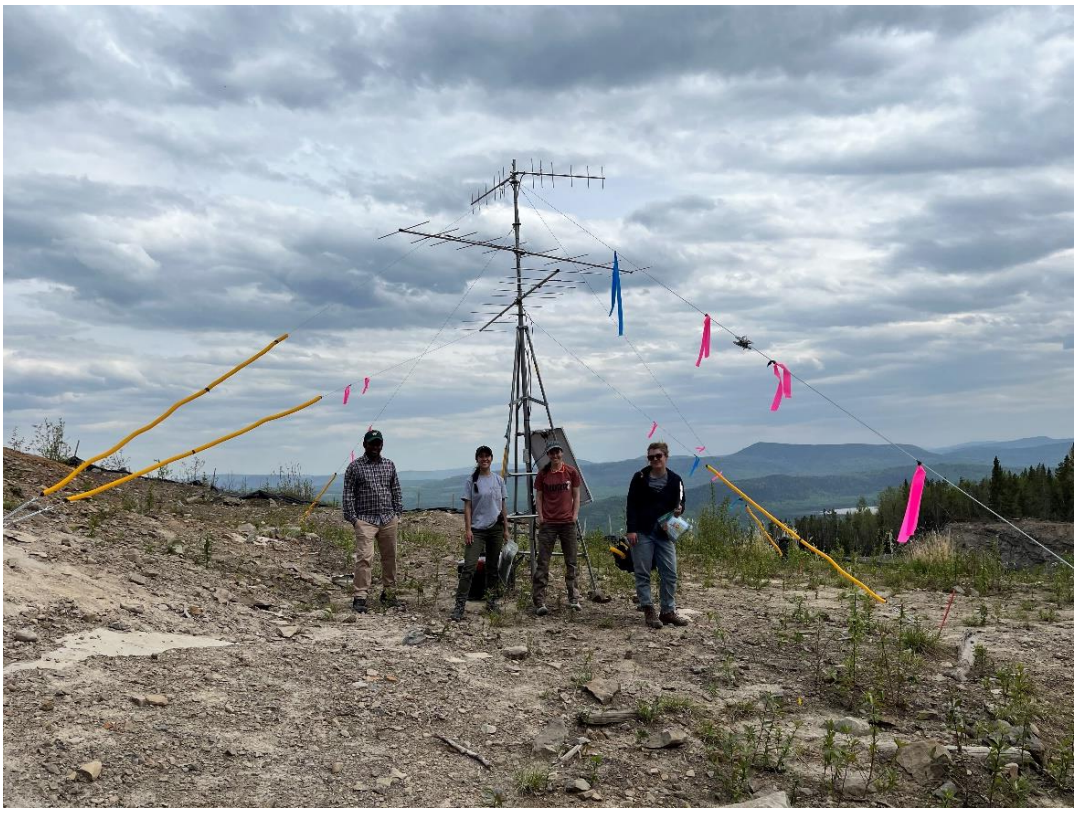
Example photos of stations

Temporary mini-Motus station along a river.

Motus station on the roof of the University of Northern British Columbia, Prince George, BC.

Motus station at Moberly Lake Elementary, Moberly Lake, BC.



Solar-powered pop-up tower Motus station at Portage Mountain, BC.

Motus station using a repurposed utility pole in the Pine Pass, BC.

Motus station at Mackenzie sewage lagoons, BC.