MOTUS WILDLIFE TRACKING SYSTEM

COLLABORATION POLICY

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Motus
Wildlife Tracking System

BIRD STUDIES CANADA
ÉTUDES D'OISEAUX

Canadian co-partner of
un partenaire canadien de
BirdLife INTERNATIONAL

Motus Wildlife Tracking System

Bird Studies Canada

PO Box 160, 115 Front Rd. Port Rowan, Ontario. N0E1M0

Phone: 519-586-3531 × 162

Email: motus@birdscanada.org

birdscanada.org/research/motus

motus-wts.org

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Translations:

Cette version est une ébauche. Une fois le document finalisé, il sera traduit et disponible en français.

Esta versión es un borrador. Una vez que el documento esté finalizado, será traducido y disponible en Español

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1. **Introduction**

The purpose of this document is to outline what researchers can expect by choosing to use the Motus Wildlife Tracking System (Motus - motus-wts.org).

Motus comprises the coordinated physical and database infrastructure to track the movements of organisms using automated radio telemetry. Motus links the efforts of many independent researchers interested in animal movement, at multiple spatial and temporal scales.

Motus is a program of Bird Studies Canada (BSC) in partnership with collaborating researchers and organizations. It is supported by BSC and collaborators, the Government of Canada - Environment Canada, the Crabtree Foundation, the W. Garfield Weston Foundation, and through the Canada Foundation for Innovation in partnership with Western University, Acadia University and the University of Guelph. In addition, research partners have made important contributions through their own institutions.

Motus is possible because digitally encoded transmitters allow many thousands of animals to be detected on the same frequency. Researchers affix radio transmitters (tags) that emit a unique identifier that is detected and recorded by automated receiving stations in the landscape. Thousands of tags can be simultaneously deployed and tracked within the system, which currently (December 2015) comprises more than 300 receiving stations throughout North and South America. Each telemetry station can detect signals from active tags at distances of up to 15 km.

Motus requires centralized processing and data management. **Centralized processing allows any registered tag to be detected on any receiver and assigned to the associated project and metadata.** Centralized data management is necessary because the tag signal itself contains only limited information (a unique identifier), which must be linked to the central metadata registry to properly associate the tag identified with other information (e.g., the species that was tagged, where it originated, and when it was deployed in the field).

Motus collaborators register their project and information about transmitters and receivers with BSC, which is responsible for the centralized processing and data management for Motus. BSC also provides archiving, data access, summary, visualization, and dissemination tools to researchers and the public. The technical processes for tag and sensor registration are explained in technical documents available on the Motus website.

2. **Network Coordination and Management**

BSC is responsible for the overall development, coordination and support of the Motus network. This includes:

- expanding the network of users through communication, facilitation and collaboration
- supporting the activities of Motus users
- development of protocols and policies
- data processing, filtering, dissemination and archiving for researchers
- development and dissemination of data management and analysis tools

- development of public visualizations of the data to enhance public appreciation of the movements and migration of study animals and
- fundraising to support the core program, expansion and development.

The development of Motus was facilitated by a core group of researchers and representatives of supporting organizations (the Motus Forum). The group includes Principal Investigators (PIs) associated with Motus deployment in Ontario and Atlantic Canada supported by a grant from the Canada Foundation for Innovation, representatives of Environment and Climate Change Canada-Canadian Wildlife Service, the United States Fih and Wildlife Service, and other principal collaborating researchers. The Forum's role is to provide advice and guidance to the development and implementation of Motus and coordination of activities among users. The Forum will be expanded as more principal collaborators and supporters become active. Much of its activities will take place through web based forums and email, but it will also take advantage of other venues (e.g., conferences and meetings) where a number of collaborators will be present.

3. **Data Accessibility & Stewardship**

The Motus database (motus-wts.org) is the central repository for all of the information collected through this collaborative enterprise. The Motus data policy has been designed to facilitate access to data and maximize benefits for wildlife resource management through scientific publications and increased public engagement. At the same time, the policy also recognizes the existence of constraints or sensitivities that may at times limit the availability of data, including the desire for researchers to publish prior to data release, and the protection of sensitive species. By contributing data (including metadata) to the Motus database, participants agree to abide by a code of conduct regarding the use of data generated by other collaborators.

User-contributed Motus data includes:

1) **Receiving station deployment metadata**, which provides information about sensor location, antenna configuration, deployment dates, etc.
2) **Tag deployment metadata**, which provides information about the animal to which the tag was attached (e.g. species, age, and measurements), the release site and date, the type of tag, etc.
3) **Tag detection data** as captured by the sensors, which provides the properties of the signal (including tag and sensor identifiers, antenna number, date and time, signal strength, etc.).

Motus data types:

The data contributed will fall into several levels of availability.

1) Basic dataset: This publicly available dataset includes basic deployment metadata from tags and receiving stations from all projects (location, deployment dates and species), as well as summary-level detection information (which tags were detected at each receiving station on a given day, with associated metadata). Associated details such as exact times of detection, tag

signal properties, and the antenna on which they were detected) will not be available. The basic open-access dataset will be searchable and fully downloadable, and available through various public exploration tools (summary tables or maps). With possible rare exceptions (e.g., data on endangered species), the basic dataset will be publicly available for all projects.

2) Detailed dataset: Detailed data primarily refer to individual detections of tags and associated data, as well as processed interpretations of those data (e.g. estimated real-time position at receiving stations). The accessibility of detailed data within Motus is 'user-defined' and determined on a project basis by PIs that deployed the tag information, following 3 possible access levels: 1) unavailable (private), 2) discoverable and available by request, and 3) publicly available. In addition, P's will be able to determine which components are to be included in a detailed dataset release. These may include, for example, custom tag metadata, detailed tag detection information and processed results.

3) Private data: This category refers to data which will not be made available to anyone except the users authorized by the PI within each project. These data will not be included in either the basic or the detailed datasets (e.g. personal information associated with a particular receiver station, such as landowner name and contact details).

Motus data types, corresponding access levels, and descriptions:

1) Receiving station deployment metadata

Data Type	Access Level	Description & Notes
Receiving station unique identifier and serial number	Public (basic)	Unique identifier assigned to each receiving station
Exact GPS location and operational dates of each deployment	Public (basic; positions rounded to nearest 0.5 degrees)	Receiving stations deployed on mobile platforms will be identified as "mobile" with a user defined location.
Project descriptors (name(s) of project leader(s) and project ID/link to Motus site)	Public (basic)	User defined: As entered by the individual project leaders
Receiving station configuration	Public (basic)	Antenna numbers, bearings, height, and equipment details.
Land ownership contact information	Private	Details on land ownership (name and contact details) can be managed by project leaders, but are not released to any other project or the public.
Deployment name and comments	User-defined (detailed)	This is the custom name entered by project leaders to identify their deployments, or other comments linked to their deployment or site visits.

2) Tag deployment metadata

Data Type	Access Level	Description & Notes
Tag unique identifiers	Public (basic)	
Exact GPS location and release date of the tag deployment	Public (basic; GPS data rounded to nearest 0.5 deg)	
Project descriptors (name(s) of project	Public (basic)	As entered by the individual project

leader(s) and project ID/link to Motus site)		leaders on the Motus web site
Species identity	Public (basic)	Taxonomic names
Custom properties (additional characteristics of the animal or deployment as entered by the project leaders, such as age and sex, morphometric measurements, condition and other markers).	User-defined (detailed)	When available (by request or public), this information is included within the detailed dataset.
Tag properties (e.g. manufacturer, program, size, frequency and burst rate)	User-defined (detailed)	Some properties may be private to protect proprietary information.

3) Tag detection data

Data Type	Access Level	Description & Notes
Summary detections (list of tags, with their unique identifier, detected at each receiving station over a fixed period, such as daily)	Public (basic)	This is generally the information available for public data exploration and coarse mapping.
Individual detections, including signal properties (e.g. signal strength), exact time of detection, as well as tag, sensor and antenna identifiers that can be used to link to more detailed metadata.	User-defined (detailed)	Processed detailed detections are available to tag project leaders, regardless of where they were detected.
Processed data (e.g. interpolation of position based on multiple detections)	User-defined (detailed)	Derived from future development of tools for the analysis and visualization of animal movement models

Public Visualizations:

Motus will encourage researchers as well as the general public to explore and appreciate data gathered throughout its network in an open way. In order to balance the need for privacy with the benefits of open data, the Motus site will offer public visualizations that are based on basic summaries of movement data (e.g. map showing track of movement among sensors on an hourly basis, or list of tags detected at a particular sensor on an hourly or daily basis). Those basic summary visualizations will be available for tag data from all projects, regardless of other privacy settings. Users should keep in mind that in most cases, the temporal and spatial resolution of public data will not be detailed enough to be useful to anyone in a way that competes with the research or publications interests of the investigators.

Exceptions:

Generally, data for species at risk will be treated similarly to that of any other species, keeping in mind that the coarseness of the spatial resolution of the public data (i.e. within detection range of a receiver) will usually not represent a conservation concern. However, there will be an exceptional provision to exclude tag detection data from public visualizations and downloads when warranted. In order to avoid any misunderstandings, PIs wishing to restrict access to data on sensitive species must contact BSC prior to registering tags in the network. Each request should provide a rationale for the restriction and whether it should be permanent or for a fixed duration only (e.g. data release is delayed 3 months).

Similar exceptions can be made to restrict access to receiver location metadata and antenna configuration, but only under exceptional circumstances, as this effectively makes the receiver data useless to other researchers.

Other Agreements:

Where separate organizational agreements exist (e.g., U.S. Department of Interior, Government of Canada - Environment Canada), this policy is valid within the bounds of those specific agreements. If discrepancies exist between the two, the organizational agreements will take precedence.

4. Registration

Project Registration:

Cooperators will register with Motus at motus-wts.org and be designated as a PI or Collaborator and assigned a project. From there, these users will be able to manage their project summaries, receiving station metadata (e.g., station location, antenna size and orientation), tag metadata (e.g. species, deployment date), upload and download their project data, view basic summary plots and visualizations, control some of the public data outputs (e.g. raw data access, visualizations), and manage cooperator information (e.g., technicians, collaborators, landowners). PIs will be able to create and manage multiple projects as distinct entities, and decide how tags and sensors get assigned to each of these projects. *Some of the described functionalities are still under development.*

In order to retrieve data from the Motus system, users must have registered and made sufficient metadata available from their tags and receivers, to enable the use of the data by the Motus community (as described above).

Tag registration:

Tag registration is currently being managed by SensorGnome.org. See instructions at https://sensorgnome.org/VHF_Tag_Registration.

Users must 'register' their VHF radio transmitters with Motus. Normally, the tags used are coded 'nano-tags' provided by Lotek (www.lotek.com), but can also be ‘beeper tags’, or coded tags of some other type (users of ‘other’ tags should contact the Motus organizers before assuming that those tags can be properly detected by the system). By registering tags with Motus, a researcher is agreeing to the terms of this policy. Tags being used in the Western Hemisphere transmit at 166.380 MHz. Tags may operate on different frequencies, but any deviations from the norm should be coordinated among researchers and Motus well in advance of tag purchase and deployment.

Motus does not control the use of the specific frequency noted above, and may decide to change or add to this frequency in the future. Users not wishing to participate in the Motus network should avoid the use of any Motus frequency, or risk their data being compromised.

Tag Registration Fee:

A tag fee covers the costs of essential data services associated with management and operation of the Motus database and coordination of the network. See *Annual Tag Fee Schedule*.

5. **Permission to Publish & Professional Courtesy**

All investigators and other users of Motus data are expected to exhibit professional courtesy and utilize the data within the bounds of the highest scientific integrity. In particular, information about foreign tags beyond that which is obtainable from the public visualizations should not be used in unpublished technical reports or popular or scientific publications without the permission of the PI. The process for requesting such permission will be managed through the Motus web-site.

Citation:

Please reference Motus and all relevant partners in each publication and reports.

Use of data retrieved from Motus (motus-wts.org), or provided by SensorGnome.org:

If Motus data are used in your analysis, the citation should be as follows:

[Data owner name]. 2015. [Dataset name]. Data accessed from the Motus Wildlife Tracking System. Bird Studies Canada. Available: http://www.motus-wts.org /. Accessed: [Date].

Example:

Bird Studies Canada. 2015. Atlantic Canada Bicknell's Thrush Project. Data accessed from Motus Wildlife Tracking System, Bird Studies Canada. Available: http://motus-wts.org/. Accessed: 24 November 2015.

Use of Motus visualizations or output tools using data from multiple datasets.

If Motus tools are used in your analysis the citation should be as follows:

Bird Studies Canada. 2015. Motus Wildlife Tracking System. Port Rowan, Ontario. Available: http://www.motus-wts.org. Accessed: [Date].

Publications:

PIs are strongly encouraged to share publications, reports, or management plans that use Motus data or related technology with the Motus Publications page - http://motus-wts.org/data/publications.jsp, or notify Motus by contacting motus@birdscanada.org.

Study planning and co-authorship:

We expect that many PIs will plan studies that make explicit or implicit use of receiver data from other PIs. When a substantial proportion of encounter data are expected or reported from receiving stations maintained by others, Motus strongly encourages PIs to discuss details and expectations of the project, as well as issues of authorship and acknowledgement on publications prior to the start of the study. All contact information for PIs associated with each receiver is available to users on the Motus webpage, or Motus staff will gladly facilitate communication between investigators where possible.

The following guideline may be used for acknowledgement and co-authorship, but specific details should be worked out between parties beforehand. PIs may wish to consider the proportion of data being used as a result of another PIs infrastructure. As a guideline:

0-10%, acknowledgement optional;
10-33% receiver PI should be acknowledged;
>33%, co-authorship should be offered (receiver PI can naturally decline). A

Agreements may also need to be established regarding other forms of compensation between PIs in exchange for any additional tower maintenance, or changes to station setup or operation schedules.