

Alberta Biodiversity
Monitoring Institute

www.abmi.ca

Processing Terrestrial Bird Recordings

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Table of Contents

Summary	1
Sound Recording and Data Management.....	2
Sound Recording Management while in the Field	2
Sound Recording Transfer from the Field to the Sample Processing Center	2
Sound Recording Transfer from RAM to the Bird Expert	2
Data Entry During Expert Identification	3
Sound Recording and Data Transfer from the Bird Expert to RAM	3
Sound Recording and Data Transfer to and from RAM during Classifications of Unknowns	3
Data Update When Unknown Vocalizations are Classified	3
Sound Recording and Data Transfer to and from RAM during Verification	3
Long-term Curation at the RAM	4
Expert Identification of Bird Species from Recordings	5
Selecting the Expert	5
Identifying Bird Vocalizations on the Recordings	5
Verifying Expert Identifications	6
Taxonomic Nomenclature	6
Appendix 1: Sample Tracking Log	7
Appendix 2: Bird Recording Database	8

Summary

This report describes the protocols (methodology) presently being used by the Alberta Biodiversity Monitoring Institute (ABMI) to process breeding bird recordings. Recordings are collected at nine point stations in a 36 hectare area around each ABMI survey site and saved as digital sound files. These files are reviewed by an expert ornithologist and the vocalizations identified to species.

Sound Recording and Data Management

Recordings of bird vocalizations are collected during ABMI surveys. These recordings, and the accompanying data, pass through a variety of facilities during processing. To ensure that sound recordings and data are not lost, all recordings received by the Sample Processing Center (RAM) are tracked using the Sample Tracking Log (Appendix 1). All subsequent transfers of recordings and data are recorded in the log.

Sound Recording Management while in the Field

- Each day after collecting bird recordings at a site, field crews download sound files from the bird recorder to a field computer.
- Field crews name the files: ABMI_year_site_PointCountStation.MP3.
- All 9 bird recording files from one site are saved in a single folder named by site number.
- A copy of the bird recordings are retained on the field computer as well as an external drive or CD.
- Copies of the files are stored in a separate location from the field computer.

Sound Recording Transfer from the Field to the Sample Processing Center

- At the end of each shift (sooner if possible) field crews give the field coordinator a CD (or portable drive) containing a copy of the bird recordings for each site.
 - The field coordinator ensures that all the recordings from each site are present, or their absence accounted for.
 - The field coordinator checks the quality of each sound file.
 - Recordings are logged in by the field coordinator and the reason for any absences noted in their log book.
 - The log book includes information about the date the recordings were collected, handed to the field coordinator, the ABMI sites where the samples were collected, and the number of point count station with recordings completed.
- The field coordinator copies all the bird recordings to a master folder, on a secure computer with overnight backup. This master folder has the following structure
ABMI_year_BirdRecordings/ABMISite#/ ABMI_year_site_PointCountStation.MP3
- Once all the bird recordings are present for all sites surveyed during a year, the field coordinator copies the files to a DVD-R or portable hard drive and takes these to the Sample Processing Center. A printed copy of the site numbers and point counts surveyed plus other pertinent comments are included with each disk. If there are any missing recordings, these are noted on the print-out
- Samples are “logged-in” when they arrive at the Sample Processing Center. Each shipment is assigned a “lot number”, and the contents of each lot are tracked by that number (Appendix 1).
- The sample tracking log includes information about the date the lot arrived, the location where the samples are stored, the ABMI sites where the samples were collected, the number of samples of each type in the lot, and a detailed listing of the information about each sample.
- The ABMI lab coordinator ensures that all files, from each ABMI site, are present and recorded in the log book.
- The ABMI lab coordinator copies the files onto a secure computer with an overnight backup in a different location.

Sound Recording Transfer from RAM to the Bird Expert

- The ABMI lab coordinator copies the recordings from the secure computer to a portable hard drive.

- The hard drive plus a printed description of the contents are packaged in a cushioned courier envelope and sent via courier to the expert.
- The RAM lab coordinator contacts the expert to ensure the copies have arrived and that all files are readable, and then notes this transfer in the log book.

Data Entry During Expert Identification

- The ABMI lab coordinator sends an electronic copy of the Bird Recording Database (Appendix 2) to the taxonomic expert.
- The taxonomic expert fills in the required information as bird vocalizations are identified.

Sound Recording and Data Transfer from the Bird Expert to RAM

- All recordings plus an electronic copy of the results are packaged in a cushioned courier envelope and returned to the Sample Processing Center.
- In addition, the expert emails a copy of the completed Bird Recording Database to the ABMI lab coordinator.
- Reference, voucher, and unknown vocalizations are stored in new files by the expert (see below) and returned with the original data.
- The ABMI lab coordinator ensures that all the required information and materials have been returned from the expert, notifies the expert that everything is present, and then records the transfer in the log book.
- The lab coordinator copies files with reference and unknown vocalizations onto a secure computer that has an overnight backup in a different location.

Sound Recording and Data Transfer to and from RAM during Classifications of Unknowns

- Recordings that the expert has highlighted and isolated as unknown are transferred from the secure computer to an external hard drive.
- The hard drive plus a printed description of the contents are packaged in a cushioned courier envelope and sent via courier to a second expert.
- The RAM lab coordinator contacts the expert to ensure the copies have arrived and that all files are readable, and then notes this transfer in the log book.
- In addition, the ABMI lab coordinator emails a copy of a spread sheet that lists the unknown recordings to the second expert.
- The second taxonomic expert fills in the required information as unknown bird vocalizations are identified.
- All recordings plus an electronic copy of the results are packaged in a cushioned courier envelope and returned to the Sample Processing Center.
- In addition, the second expert emails a copy of the completed spread sheet to the ABMI lab coordinator.

Data Update When Unknown Vocalizations are Classified

- The ABMI lab coordinator reviews the spread sheet returned from the second expert and uses the identifications listed on the spread sheet to update the Bird Recording Database
- The updated version of the Bird Recording Database is sent to the ABMI Information Center.

Sound Recording and Data Transfer to and from RAM during Verification

- The ABMI lab coordinator isolates bird recordings for verification on an external hard drive.

- The hard drive plus a printed description of the contents are packaged in a cushioned courier envelope and sent via courier to the verification expert.
- The RAM lab coordinator contacts the expert to ensure the copies have arrived and that all files are readable, and then notes this transfer in the log book.
- In addition, the ABMI lab coordinator emails a blank copy of the Bird Recording Database to the verification expert.
- The verification expert fills in the required information as bird vocalizations are identified.
- All recordings plus an electronic copy of the results are packaged in a cushioned courier envelope and returned to the Sample Processing Center.
- In addition, the verification expert emails a copy of the completed Bird Recording Database to the ABMI lab coordinator.

Long-term Curation at the RAM

- Copies of all original bird recordings and vouchers are maintained indefinitely by the ABMI Information Center.
- The reference vocalization library is maintained at RAM and a copy is sent to the ABMI Information Center.
- Unknown recordings are maintained at the Sample Processing Center (RAM) and the ABMI Information Center until the unknown has been definitively identified.

Expert Identification of Bird Species from Recordings

A qualified ornithologist reviews ABMI recordings from each point count at each site and classifies the vocalizations to species.

Laboratory Equipment

- Computer with 20 GB memory*
- Sound editing software*
- Reference bird recordings*
- Headphones*

Selecting the Expert

- The ABMI will select experts who are known specialists in the field of ornithology. To ensure the highest of standards, and to maintain ABMI's level of credibility, the ABMI will only select experts who can meet at least one of the following criteria:
 1. Expert is endorsed by the Royal Alberta Museum, or an associated museum (e.g. Canadian Museum of Nature), as capable of identifying bird vocalizations with $\geq 95\%$ accuracy.
 2. Expert is endorsed by 2 members of the scientific community, recognized in the field of ornithology, as capable of identifying bird vocalizations with $\geq 95\%$ accuracy.

Identifying Bird Vocalizations on the Recordings

- Species are identified based on the reference vocalization library that has been collected in or near Alberta.
 - Species names are based on the references listed in the taxonomic nomenclature.
 - RAM maintains the taxonomic references, and if there is discrepancy between references determines their order of precedence.
 - If during the process of identifying a vocalization additional reference literature is needed to determine the species name, the expert will note this additional literature in the database and forward a copy to the ABMI lab coordinator.
- Listen to each .MP3 recording using sound analysis software that displays waveforms.
- Record all bird species heard, as well as all incidences of Red Squirrel (*Tamiasciurus hudsonicus*) (using 4-letter ABMI codes).
- When a new individual is detected during a point count, record the time the individual was detected and the individual's behavior (see Appendix 2 for a copy of the database).
- After the first detection of each individual record the presence/absence in each of the 3 time intervals.
 - Interval 1 = 00:00:00-00:03:20
 - Interval 2 = 00:03:21-00:06:40
 - Interval 3 = 00:06:41-00:10:00
- Ensure as many vocalizations as possible are identified; rewind and review all or part of each recording as necessary.
- To avoid fatigue and error, only interpret information from one ABMI site (9 ten-minute recordings) before taking a break. Do not resume analysis until fully rested.
- To maintain accuracy, a maximum of two ABMI sites (18 point counts) are analyzed in one day.
- Isolate at least one copy of each unique vocalization (called a voucher vocalization) from each species each year.
- Place voucher vocalizations into an electronic voucher files with the species name. Label the file: ABMI_year_species_ABMISite#_VariationNumber.MP3 (e.g. ABMI_2004_YRWA_1634_var1.MP3).

- Note the times of unique vocalizations (dialects) that should be added to the reference library. After the analysis is complete, copy the unique vocalizations into the reference library. Labeling of reference vocalizations should follow the format: Species_Variation number_General Location_Year_Behavior Code (eg., YRWA_var1_Grande Prairie_2004_S)
- Isolate vocalizations that cannot be identified by copying that portion of the sound file to a separate file. Label the file: ABMI_year_site_PointCountNumber_UneNumber_date_TimeSinceStartofRecording.
- Unknown vocalizations are sent to other experts for identification.

Verifying Expert Identifications

- Bird recordings that have been identified by experts will undergo a verification process by their peers to ensure accuracy.
- For each expert identifying ABMI bird vocalizations, 10% of the identified bird vocalizations (up to a maximum of 200) will be randomly selected for verification. Note that at least one randomly selected vocalization from each species will be included.
- The ABMI lab coordinator will re-label each recording with a reference number and send the sound file to a second expert that meets the above credibility criteria.
- The second expert will identify the vocalization and record the species name beside the matching reference number on the provided data sheet.
- The second expert will ship the recordings back to the ABMI, and email the data sheet to the ABMI lab coordinator.
- The ABMI lab coordinator will compare the data between the two experts.
- Discrepancies are reviewed by both experts (plus additional experts if necessary) to determine the identification based on the most recent literature and reference recordings. If a discrepancy cannot be resolved, the specimen in question will be recorded in the database as “unknown”.
- If, after all discrepancies have been resolved, there is $\geq 5\%$ error on the part of the initial taxonomic expert, then the species with $\geq 5\%$ mis-identifications are highlighted. All individuals the initial expert identified from the highlighted species are re-identified to confirm their identity.

Taxonomic Nomenclature

- Stokes D. 1999. Stokes Field Guide to Bird Songs: Western Region (Audio CD). Hachette Audio, New York, NY, USA.
- Righter, R. and Keller, G.A. 1999. Bird Songs of the Rocky Mountain States and Provinces (Audio CD). Cornell Laboratory of Ornithology, Ithaca, NY, USA.
- The Cornell Laboratory of Ornithology website <http://www.allaboutbirds.org/guide/>
- ABMI Bird Recording Reference Library

Literature

Lepage, Denis. 2005. List of North American birds and standardized 4-letter species codes. Unpublished data. Bird Studies Canada.

Appendix 1: Sample Tracking Log

Note: This is a portion of the complete Sample Tracking Log that shows only the columns relevant to the receiving and processing of bird recordings.

Page 1 of 2

RAM ACCESSION INFO					ABMI SAMPLE COLLECTION INFO					BIRD RECORDINGS	
Data Series Count	Project	Year	Group	RAM Lot #	Date Received	Sample Type	Site #	Subsite	Collector	Date Collected	Total Recordings Received
1											
2											
3											
4											
5											
6											
7											
8											
9											

Page 2 of 2

SAMPLE DISPOSITION									
Data Transferred to Database	Samples Sent for Sorting	Samples Returned from Sorting	Samples Sent for Advanced ID or Processing	Samples Returned from Advanced ID or Processing	Database Sent to Information Center	Current Sample Disposition	Current Residual Disposition	Samples Transferred to RAM's TMS	Comments

Appendix 2: Bird Recording Database

Page 1 of 2

ABMI FIELD DATA						ADVANCED IDENTIFICATION			
Data Series Count	RAM Lot No.	Site Number	Point Count Location	Recorded By	Recording Date	Identification Date	Identified By	Species (Common Name)	ABMI Species Code

Page 2 of 2

ADVANCED IDENTIFICATION								
Time of First Detection (sec)	Intro Time (sec)	P1 Interval (0:00 – 3:20)	P2 Interval (3:21 – 6:40)	P3 Interval (6:41 – 10:00)	Behavior Code	Verified by	Verification Date	Expert Comments