



# Acoustic Processing Methods and Raw Data Metadata

*Version 1.0,  
October, 2019*

# Contents

WildTrax Acoustic Transcription Methods and Metadata	3
Acoustic Processing Methodology	3
Transcription Processing Length	3
Species Tagging	4
Abundance Estimation	5
Acoustic Data Metadata	6



# WildTrax Acoustic Transcription Methods and Metadata

## Acoustic Processing Methodology

Processing of acoustic data is undertaken in the online WildTrax platform, following the Acoustic Transcription Guide Protocol V 2.0 (October 2019).

## Transcription Processing Length

Acoustic data is sub-sampled and transcribed for specified intervals within the recordings. Standardized transcription methods, analytical techniques and methodological recommendations are provided by the Bioacoustic Unit (<http://bioacoustic.abmi.ca/resources/protocols/>). These methods involve either 1 min, 3 min, 5 min, or 10 min sub-samples which are fully annotated by human listening (i.e., no visual scanning) of raw recordings that are visualized as spectrograms in WildTrax. Table 1 describes the current methods that are operational within the WildTrax interface. The list of methods is constantly evolving and so the list below may not capture the full range of listening method options. Contact [info@wildtrax.ca](mailto:info@wildtrax.ca) to get the most up to date information.

**Table 1**

## WildTrax Acoustic Transcription Methods

Method	Description	Usage
1M 2SPM	1 min recording, a unique species-individual can be tagged a maximum of 2 times per minute	Community analysis, productivity tracking
3M 2SPM	3 min recording, a unique species-individual can be tagged a maximum of 2 times per minute	Community analysis, productivity tracking
1M 1SPM	1 min recording, a unique species-individual can be tagged a maximum of 1 time per minute	Community analysis
3M 1SPM	3 min recording, a unique species-individual can be tagged a maximum of 1 time per minute	Community analysis
5M 1SPM	5 min recording, a unique species-individual can be tagged a maximum of 1 time per minute	Community analysis
10 1SPM	10 min recording, a unique species-individual can be tagged a maximum of 1 time per minute	Community analysis
7mVS+3m1SPM	10 min recording, the first 7 min as visual scan <sup>1</sup> 1SPM, last 3 min as 3m 1SPM	Community analysis, optimization of data collection, rare species tracking
2M 1SPR	2 min recording, a unique species-individual can be tagged once per recording limit	Community analysis
2M 1SPM	2 min recording, a unique species-individual can be tagged a maximum of 1 time per minute	Community analysis
3M 1SPR	3 min recording, a unique species-individual can be tagged once per recording limit	Community analysis
5M 1SPR	5 min recording, a unique species-individual can be tagged once per recording limit	Community analysis
3m1SPM+7mVS	10 min recording, first 3 min as 1SPM, last 7 as visual scan; a unique species-individual can be tagged a maximum of 1 time per min	Community analysis, optimization techniques, rare species tracking

<sup>1</sup>Visual scanning is another method that allows users to quickly scan through a recording and visually identify species vocalizations.

## Species Tagging

Within the WildTrax processing platform, raw acoustic data is transcribed by drawing boxes around visual signals on a spectrogram. The recording is listened to and visualized as a spectrogram simultaneously, and boxes are drawn by clicking and dragging directly on the spectrogram. Metadata is then entered into a species tagging form, where the transcriber describes: the species ID (via either AOS code or common name), the confidence level in the ID, the number of individuals of a species (abundance), and the type of vocalization (song, call, non-vocal). AOS codes, generic and species epithets and common names are updated annually following

the AOS supplements. Click here for more details. Amphibian, mammal, insect and abiotic 4-letter codes (similar to the AOS system) have been created within the WildTrax database to ease data collation.



## Abundance Estimation

Abundance is recorded for each tag created within WildTrax. A different approach is used for estimating amphibian abundance than for birds and mammals.

For birds and mammals, there are only two abundance codes: One, which represents a single individual being tracked throughout the recording, and “Too Many to Count” (TMTC) which is used for situations such as flocks, family groups or where individuals are indiscernible. When TMTC is used, an Abundance Estimate (AE) is provided by the observer (i.e., AE: 3 – 5 individuals).

Amphibians are always ranked by their call intensity (CI) rather than by distinguishing individuals. Call intensity is used as a metric for relative abundance and is adapted from the North American Amphibian Monitoring Program (NAAMP) Amphibian Calling Index (ACI) (Weir, L.A. and M.J. Mossman. 2005. Amphibian Declines: The Conservation Status of United States Species, Chapter: North American Amphibian Monitoring Program, Publisher: University of California, Editors: Michael J. Lannoo, pp.307-313 ). During the breeding season, many amphibians congregate together making individual counts difficult. Therefore, we use a common measure of estimating abundance.

**Table 2**

Description of abundance estimation codes

Abundance Code	Description	Applies to
1	One individual	Birds and Mammals
2	Many individuals (“Too Many To Count”) –abundance estimate must be provided in the comments in the form of AE (Abundance Estimate): min-max	Birds and Mammals
3	CI1: Individual amphibians can be counted; there is no overlapping of calls	Amphibians
4	CI2: Individuals can be distinguished but there is some overlapping of calls	Amphibians
5	CI3: Full amphibian chorus; calls are constant, continuous and overlapping	Amphibians

## Acoustic Data Metadata

The following fields are included as a part of the current Data Download feature within WildTrax. These metadata correspond the “wide format” of data output. Other download formats will be available in the future.

**Table 3**

Metadata for acoustic data download

Term	Attribute Definition	Type	Format
Project	Unique project name	Text	
Data_Set	A label that identifies who the data was collected by (eg. ABMI)	Text	
Site	Site name. Site is a label used to categorize groupings or clusters of ARU stations	Text	
Station	Station name. Station is a label to identify a unique spatial location of an ARU (eg. 1, 2, 3,...)	Text	
Recording Date	Date the recording was made	Date	YYYY-MM-DD
Recording Time	Time the recording was made	Time	HH:MM:SS
Status	Project status description	Text	In progress   Transcribed   Bad Weather
Latitude	Latitude of the ARU station in decimal degrees using datum WGS84	Numeric	DDD.ddddd
Longitude	Longitude of the ARU station in decimal degrees using datum WGS84	Numeric	DDD.ddddd
Is buffered location?	Identifies whether or not the location has a spatial buffer applied	Value	t   f
Species Code	American Ornithological Society species code	Text	4 Letter Code
Species Name	Scientific name of the species detected	Text	
Species English Name	Common name of the species detected	Text	
Method	Transcription method used	Text	1M 2SPM   3M 2SPM   1M 1SPM   3M 1SPM   5M 1SPM   10 1SPM   7mVS+3m1SPM   3M 1SPR   5M 1SPR   3m1SPM+7mVS (Table 1)

Term	Attribute Definition	Type	Format
Rain	Average rain noise level across the transcription interval	Value	0   1   2   3
Wind	Average wind noise level across the transcription interval	Value	0   1   2   3
Noise	Average background industrial noise level across the transcription interval	Value	0   1   2   3
Industry Noise	Average chronic industrial noise level across the transcription interval	Value	0   1   2   3
Audio Quality	Addresses a number of audio issues	Text	0   1   2   3
Species Individual Name	A number assigned to track individuals	Text	
Transcriber	The name of the person who transcribed the recording	Text	
Abundance	Abundance estimate of the species	Text	
Confidence	The level of transcriber confidence in the species ID	Text	1   2   3   4   5 (See Table)
min0_voc	Type of vocalization detected	Text	0 (Confident)   1 (Requires Checking)   5 (Cannot ID due to distance or distortion)
min0_start	Time in seconds at which an individual is first detected in minute 0	Text	Song   Call   Non-vocal   S-C
min1_voc	Type of vocalization detected	Text	SS.ms
min1_start	Time in seconds at which an individual is first detected in minute 1	Text	Song   Call   Non-vocal   S-C
min2_voc	Type of vocalization detected	Text	SS.ms
min2_start	Time in seconds at which an individual is first detected in minute 2	Text	Song   Call   Non-vocal   S-C
min3_voc	Type of vocalization detected	Text	SS.ms
min3_start	Time in seconds at which an individual is first detected in minute 3	Text	Song   Call   Non-vocal   S-C
min4_voc	Type of vocalization detected	Text	SS.ms

Term	Attribute Definition	Type	Format
min4_start	Time in seconds at which an individual is first detected in minute 4	Text	Song   Call   Non-vocal   S-C
min5_voc	Type of vocalization detected	Text	SS.ms
min5_start	Time in seconds at which an individual is first detected in minute 5	Text	SS.ms
min6_voc	Type of vocalization detected	Text	Song   Call   Non-vocal   S-C
min6_start	Time in seconds at which an individual is first detected in minute 6	Text	SS.ms
min7_voc	Type of vocalization detected	Text	Song   Call   Non-vocal   S-C
min7_start	Time in seconds at which an individual is first detected in minute 7	Text	SS.ms
min8_voc	Type of vocalization detected	Text	Song   Call   Non-vocal   S-C
min8_start	Time in seconds at which an individual is first detected in minute 8	Text	SS.ms
min9_voc	Type of vocalization detected	Text	Song   Call   Non-vocal   S-C
min9_start	Time in seconds at which an individual is first detected in minute 9	Text	SS.ms
Comment	General comments about the whole recording	Text	
Species Comment	Comment about a specific individual in the recording	Text	





### **WildTrax.ca**

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