WABAD: A World Annotated Bird Acoustic Dataset for Passive Acoustic Monitoring

Cristian Pérez-Granados

cristian.perez@ua.es

https://orcid.org/0000-0003-3247-4182

Jon Morant Etxebarría
Kevin Félix Arno Darras
Oscar Humberto Marín Gómez
Irene Mendoza
Miguel Ángel Mohedano-Muñoz
Eduardo Santamaría
Giulia Bastianelli
Alba Márquez-Rodríguez
Michał Budka
Gerard Bota
José M. de la Peña Rubio
Eladio L. García de la Morena
Manu Santa-Cruz:
Pablo de la Nava
Mario Fernández-Tizón
Hugo Sánchez-Mateos
Adrián Barrero
Juan Traba
Tomasz S. Osiejuk
Patrick J. Hart
Navine, A
Andrés Felipe Montoya Muñoz
Carlos Barros de Araujo
Gabriel Lima Medina Rosa
Ingrid Maria Denóbile Torres
Ana Luiza Camargo Catalano
Cássio Rachid Meireles de Almeida Simões
Diego Llusia
Manuel M.B, Morales
Pablo Acebes

Juan Antonio Medina
Nicholas Brown
Christos Astaras
Ilias Karmiris
Elizabeth Navarrete
Maxime Cauchoix
Luc Barbaro
David Funosas
Dominik Arend
Sandra Müller
Fernando González-García
Alberto González-Romero
Christos Mammides
Michaelangelo Pontikis
Giordano Jacuzzi
Julian D. Olden
Sara P. Bombaci
Gabriel Marcacci
Alain Jacot
Juan Pablo Zurano
Elena Gangenova
Diego Varela
Facundo Di Sallo
Gustavo A. Zurita
Andrey Atemasov
Junior A. Tremblay
Vincent Lamarre
Anja Hutschenreiter
Alan Monroy-Ojeda
Mauricio Díaz-Vallejo
Sergio Chaparro-Herrera
Robert A Briers
Renata S. Sousa-Lima
Thiago Pinheiro
Wigna Carla da Silva
Alice Calvente
Anamaria Dal Molin
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Svetlana Gogoleva
Igor Palko
Hiếu Vũ Trọng
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Karl-L. Schuchmann
Matinez I. Marques
Ana S. de Oliveira
Nick A Littlewood
Mao-Ning Tuanmu
Yi-Ru Cheng
Hsuan Chao
Sebastian Kepfer-Rojas
Andrea L. Aguilera
Lluís Brotons
Mariano J. Feldman
Louis Imbeau:
Pooja Panwar
Aaron S. Weed
Anant Dehwal
Esther Sebastián-González
https://orcid.org/0000-0001-7229-1845

Data Note

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Abstract

Under the current global biodiversity crisis, there is a need for automated and non-invasive monitoring techniques that are able to gather large amounts of information cost-effectively at large scales. One such technique is passive acoustic monitoring, which is commonly coupled with automatic identification of animal species based on their sound. Automated sound analyses usually require the training of sound detection and identification algorithms. These algorithms are based on annotated acoustic datasets which mark the occurrence of sounds of particular species. However, compiling large annotated acoustic datasets is time consuming and requires experts, and therefore they normally cover a reduced spatial and taxonomic scale. This data paper presents WABAD, the World Annotated Bird Acoustic Dataset for passive acoustic monitoring. WABAD is designed to provide the public, the research community, and conservation managers with a novel and globally representative annotated acoustic dataset. This database includes 5,044 minutes of audio files annotated to species-level by local experts with the start and end time, and the upper and lower frequencies of each identified bird vocalisation in the recordings. The database has a wide taxonomic and spatial coverage, including information on 90,662 vocalisations from 1,147 bird species recorded at 70 recording sites in 27 countries and distributed across 13 biomes. WABAD can be used, for example, for developing and/or validating automatic species detection algorithms, answering ecological questions, such as assessing geographical variations on bird vocalisations, or comparing acoustic diversity indices with species-based diversity indices. The dataset is published under a Creative Commons Attribution Non Commercial 4.0 International copyright.

Class I. Data Set Descriptors

A. **Data set identity:** A World Annotated Bird Acoustic Dataset for Passive Acoustic Monitoring

B. **Data set identification code:** WABAD

C. Data set description

1. **Originators**: Same as authors

Class II. Research origin descriptors

A. Overall project description:

Global biodiversity is in crisis, experiencing unprecedented declines in recent decades (Maxwell et al., 2016; Pimm and Raven, 2000). This biodiversity crisis, primarily driven by increasing human activities, poses a significant challenge to conservation and management efforts worldwide (Cowie et al. 2022). As the extent and impact of these human pressures continue to grow, there is an increasing need for monitoring tools that can operate at large spatial and temporal scales to provide accurate data on species distribution, population abundance and trends, and ecosystem health (Henry et al., 2008).

Fortunately, technological advances in recent decades have led to the development of several effective, automated, and non-invasive techniques for ecological monitoring, such as environmental DNA analyses, satellite remote sensing, unmanned aerial vehicles, and camera trapping (Lahoz and Magrath 2021). One such tool, whose use has exponentially increased in recent years, is Passive Acoustic Monitoring (PAM, Sugai et al. 2019).

PAM relies on automated (or semi-automated) acoustic sensors that are programmed to record the soundscape (sounds of the environment) either continuously or at specific time intervals, enabling researchers and conservation managers to cover large spatial and temporal scales. PAM has proven to be an effective alternative to traditional survey methods for monitoring vocally active taxa in both terrestrial and aquatic environments (Sugai et al., 2019, Desjonquères et al., 2020). Its applications are diverse, including the detection of threatened or invasive species, monitoring population trends over time, and assessing ecosystem health and impacts, among other applications (e.g., Astaras et al. 2017, Gibb et al. 2019, Pieretti and Danovaro 2020, Ross et al. 2023, Alcocer et al. 2023, Bota et al. 2024). The acoustic data collected through PAM can be processed manually by visually inspecting the spectrograms; however, the large volume of data generated in most projects requires the use of automated techniques to extract meaningful ecological information (Stowell et al., 2019). To address this challenge, the development of deep-learning (DL) algorithms for analysing sound recordings has become a common solution (Kahl et al. 2021, Stowell 2022, Sharma et al. 2023). Training and evaluating DL algorithms for bioacoustics surveys requires annotated acoustic datasets (Stowell 2022, Ventura et al. 2024). Although some annotated, and open or publicly available, acoustic datasets exist, they are often limited in their geographic and taxonomic coverage, reducing their effectiveness for broader ecological applications (see e.g., Vidaña-Vila et al. 2017, Gómez-Gómez et al. 2023, Recalde et al. 2023, Jamil et al. 2023, Cañas et al. 2023). However, the growth of DL for ecological applications partly depends on the variety, quality, and availability of public and standardised annotated datasets.

Birds are the most frequently studied taxon using automated sound recorders, and consequently, most recent advances in bioacoustic surveys have focused on them (e.g., Priyadarshani et al. 2018, Sugai et al. 2019, Kahl et al. 2021, Xie et al. 2023). Indeed, several studies have demonstrated the utility of PAM for estimating bird species richness or inferring population estimates from sound recordings (e.g., Darras et al. 2018a, Pérez-Granados and Traba 2021). Birds also represent the group for which the most extensive bioacoustic resources exist, including publicly available sound repositories such as Xeno-Canto (www.xeno-canto.org), Avibase (Lepage 2021), and the Macaulay Library (www.macaulaylibrary.org). Although these sound archives have enabled the development of accurate bird recognition models (e.g., BirdNET, Kahl et al. 2021), these portals have not been created as a database for training DL algorithms, and thus their use is partly limited by: i) annotation reliability, ii) the absence of strong annotations (e.g., marking the start and end points of each bird vocalisation in the recording), and iii) the lack of complex soundscapes with overlapping sounds within these benchmark libraries. Therefore, a pre-processing stage and more detailed annotation of the archived recordings in such repositories are needed to train or evaluate DL algorithms (Morfi et al. 2019). However, annotating acoustic datasets with temporal annotations to train or evaluate DL algorithms is a highly time-consuming task that involves a significant amount of manual labour from expert annotators (Morfi et al. 2019), posing challenges for the further implementation of PAM surveys. Moreover, most of the recordings in sound archives have been made with directional microphones, which commonly have higher quality than the omnidirectional ones mounted in most commercially available autonomous recording units (ARUs). Therefore, the performance of the DL algorithms developed using such recordings may decrease when tested with recordings collected using omnidirectional microphones (Wood et al. 2021).

Currently, there are a few high-quality annotated acoustic datasets for birds, but they are limited in their taxonomic scope (e.g., Vidaña-Vila et al. 2017 and Recalde et al. 2023, which cover seven and one bird species, respectively) or geographic coverage (e.g., Lostanlen et al. 2018 and Morfi et al. 2019, which cover flight calls of nocturnally migrating birds recorded in New York and bird vocalisations recorded in Spain and France, respectively, see also Gómez-Gómez et al. 2023; Jamil et al. 2023). Therefore, although birds are the group with the most extensive acoustic resources available, there is a notable lack of high-quality, globally representative, and openly accessible annotated acoustic datasets. This absence represents a significant barrier to progress in this field, preventing researchers from leveraging the full potential of PAM to address pressing questions in avian ecology and conservation. The development of novel acoustic datasets could contribute to the creation of new DL algorithms for automated bird identification or refine existing ones, such as BirdNET (Kahl et al. 2021) or Nighthawk (Van Doren et al. 2023). Moreover, they could also help answer several other ecological questions, such as assessing geographic variation in bird songs or elucidating whether soundscape indices are related to bird species richness, to name a few.

1. **Identity**: WABAD: A World Annotated Bird Acoustic Dataset for passive acoustic monitoring

2. **Originators**: Same as authors. A detailed list of the responsible for each particular recording site, annotations, associated metadata, and the publications related to each recording site, when available, can be found in Table 1.

3. **Period of study**: Recordings were gathered from 2007 to 2024.

4. **Objectives**:

To address a critical gap in the current landscape of bioacoustics datasets, we introduce WABAD – the World Annotated Bird Acoustic Dataset. WABAD is an annotated dataset of bird vocalisations compiled through a collaborative effort that includes bird species annotations. WABAD is designed to provide the public, research community, and conservation managers with a globally representative annotated dataset for bird monitoring. Our primary goal is twofold: (1) to compile a standardised, rigorously annotated, and openly accessible dataset of bird vocalisations from a wide range of habitats and regions; and (2) to provide detailed metadata and standardised annotations that promote a culture of open data and facilitate collaboration and research across diverse applications in ecology, including the development and evaluation of DL algorithms, behavioural and evolutionary studies, and habitat assessments.

5. **Abstract**: Same as above

6. **Sources of funding**: ESG received the grant RYC2019-027216-I funded by MCIN/AEI/10.13039/501100011033 and by ESF Investing in your future. C.P-G. acknowledges the support from Ministerio de Educación y Formación Professional through the Beatriz Galindo Fellowship (Beatriz Galindo—Convocatoria 2020). BIOMON was funded by the European Union's Horizon Europe programme under grant agreement 101090273. JM was supported by Generalitat Valenciana and European Fund (CIAPOST/199-2022). MDV and SCH received the IdeaWild support DIAZCOLO0720-00. LB has received support from Biodiversa+ TABMON PCI2024-153427 project funded by MCIN/AEI/10.13039/501100011033 and the EU “NextGenerationEU”/PRTR. SCHG and SCHF has been funded by the DFG Priority Program 1374 "Biodiversity- Exploratories" (512414116, 252306891). Doñana dataset has received support from the BIRDeep project (TED2021-129871A-I00), funded by the MICIU/AEI/10.13039/501100011033 and the ‘European Union NextGeneration EU/PRTR’. MC, DF and LB have received support from ADEME as part of the PSI-BIOM project and from the National Research Agency through a Junior Professor Chair NeoSensation to MC (ANR-23-CPJ1-0174-01), the PARMENIDE project (INRAE Biosefair), the SpatialTreep project (ANR-21-CE03-0002) coordinated by Thierry Feuillet and the Terra Forma project (ANR-21-ESRE-0014). Dataset SBN and MAPIMI have received funding from Proyectos Estratégicos: Conservación de Äreas Naturales Protegidas (2022-2024), and from Red Biología y Conservación de Vertebrados, both from Instituto de Ecología, A. C. The project that collected the Dataset DUNAShas received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant No. 856506) and RSSL has received a research fellowship from CNPq (process number 311533/2022-1). SITH dataset: data collection was funded within the framework of the Single RTDI State Aid Action "Research – Create – Innovate” (grant T1EΔK-04488) and was co-funded by the European Union's European Regional Development Fund (ERDF) and national funds of the Hellenic Republic (Greece) via the Operational Programme Competitiveness, Entrepreneurship and Innovation 2014-2020 (EPAnEK). MOPU, OLIV and PINA have received support from the Comunidad de Madrid (2020-T1/AMB-20636, Atracción de Talento Investigador, Spain, PI: DLL), a research project (REMEDINAL-TE, P2018/EMT-4338; Madrid Regional Government and EU Social Fund, PI: DLL) and a project of the Fundación Universidad Autónoma de Madrid (066205, FUAM, Spain; PI: MM). Dataset OIO was funded by Portuguese Funds through the FCT – Foundation for Science and Technology, I.P., within the scope of the project EcoPestSuppression and a PhD Grant to PL (022.14253.BD). Dataset MABI was funded by the USDOI National Park Service I&M program under agreement P21AC10555. Dataset BRCAS received funding from Biodiversity Research Center, Academia Sinica. Datasets BERB, EFFOR, and EFFOU were funded by the Deutsche Forschungsgemeinschaft (DFG) in the framework of the collaborative German—Indonesian research project CRC990. Dataset OESF received support from the Washington State Department of Natural Resources. Dataset QR received funding from the Rufford Foundation and DGAPA-UNAM.

B. Specific subproject description

1. Site description

a. **Site type:** Data has been gathered at 70 sites in 27 countries (Figure 1, Table 2). Most of the data (61.4% of the recording sites, n = 43) were collected in the northern hemisphere, with northern data coming mainly from Europe (38.6% of the recording sites, n = 27), North America (14.3% of the total, n = 10), and to a lesser extent, Asia (8.6% of the total, n = 6). Nonetheless, the database includes data from six continents, with several recording sites in Central and South America (28.6% of the total, n = 20, Figure 1).

b. **Geography**: Worldwide. The specific location of the recordings can be found in Figure 1 and Table 2.

c. **Habitat**: The collected data also represents a broad range of biomes. The most represented biome was Tropical and Subtropical Moist Broadleaf Forests (26 sites), while Mediterranean Forests were also widely represented, with 10 sites. The dataset also includes sites in Temperate Broadleaf and Mixed Forests (8 sites), Boreal Forests/Taigas (7 sites), wetlands (7 sites) and Tropical and Subtropical Dry Broadleaf Forests (6 sites). The less represented biomes were Montane Grasslands and Savannas (2 sites), Tropical and Subtropical Grasslands or Savannas and Shrublands (2 sites), Deserts and Xeric Shrublands (1 site) and Temperate Grasslands (1 site). Specific biomes of each recording site can be found in Table 2.

2. Experimental or sampling design

Audio recordings

The WABAD project started in March 2023 as a collaborative effort. First, the idea of the project was shared with a reduced number of researchers with similar interests, but later, it was shared with researchers working in larger acoustic networks, such as the “Worldwide Soundscapes project” (see Darras et al., 2024) and during the “5th World Ecoacoustic Congress” (Madrid, Spain, July 2024). Additionally, and after a first preliminary analysis of the data and projects collected, focal publication searches of studies related to annotated acoustic datasets were conducted using Google Scholar and the corresponding authors were offered to join the project, especially for data collected in initially underrepresented regions.

Overall, 5,044 minutes of recordings were gathered during the project (Table 3). The selected sites and audio recordings were chosen by the contributors based on their ecological importance and bird species diversity (e.g., selected recordings were typically from the early morning hours, when bird activity was highest). All acoustic recordings included in the WABAD were obtained passively using unattended recorders. At each site, one or more autonomous recording units were deployed. The devices most used included different versions of the Song Meter recorders from Wildlife Acoustics (50% of the total, n = 35) and AudioMoth recorders from Open Acoustic Devices (34% of the total, n = 24, Hill et al., 2018), all equipped with omnidirectional microphones. Three other recording sites used different autonomous recording units that were also equipped with omnidirectional microphones (4% of the total). Nonetheless, eight recording sites used hand recorders mounted with directional microphones, although left unattended (with no human presence) in the field to record the soundscapes for several hours (12 % of the total, Figure 1 and Table 3). When more than one recorder was placed in the same habitat type and separated by a distance smaller than 30 km, the collected recordings were considered to be part of the same recording site.

The original audio files are provided in .wav format, allowing future users to either process the original audio or resample them. Although the sampling rate varied among some datasets, most of the datasets were recorded using a standard frequency of 44.1 (18 datasets, 25.7% of the total) or 48 kHz (27 datasets, 38.6% of the total, see Table 3), and all datasets were recorded using a sampling rate high enough to ensure that all bird vocalisations could be recorded. Contributors also provided the metadata regarding their site location (e.g., geographic coordinates, biome, Table 2) and recording parameters (e.g., sampling rate, recorder model, Table 3).

Audio Annotation

For data standardisation, we developed a detailed annotation protocol. The protocol was designed to provide strong annotations, although in a few datasets, the participants provided weak annotations (Table 1) - i.e., they annotated bird vocalisations with long annotations that encompassed multiple bird vocalisations but also silences in the recording. Nonetheless, most datasets provided strong annotations (95% of the total, see specific datasets with strong labels in Table 1). Annotations were generated by expert ornithologists, familiar with the local avifauna, who were trained - if required - and assisted in using the annotation software. The ornithologists examined the audio file spectrograms and provided annotations for bird vocalisations by selecting the spectral view and auditory inspections in Raven Pro 1.6. (Bioacoustic Program 2024), using the default configuration parameters (Window type= Hann, DFT size= 512 samples, brightness= 50, contrast = 50). However, the experts were free to adjust the parameters of the spectral view at their convenience for the species identification. We did not discriminate between the different vocalisation types of a bird species (i.e., song or call), and just provided the identification of the species vocalising.

The audio annotation process consisted of opening a complete audio file in Raven Pro 1.6, and then marking with a box the portion of the file where a bird vocalisation occurred. The box was narrowed at its maximum to include the whole bird vocalisation (without harmonics if possible) and mark the exact starting and ending time, as well as the maximum and minimum frequency of each vocalisation (i.e., strong annotation). Two bird vocalisations of the same species were allowed to be annotated together when they were separated by less than one second; otherwise, a new annotation was created. Separate annotations were created for overlapping calls of different species. We did not apply any quality criteria (e.g., considering only sounds of high signal-to-noise ratio or high amplitude) to include bird vocalisations in WABAD; the only criterion was that the expert was sure about the species' identity. Sounds uttered by other taxa (i.e., non birds), humans, or human activities were not included. For each vocalisation, the annotators provided the scientific name of the bird species following the Clements list (Clements et al., 2021). Such nomenclature is the same as the one used in BirdNET v2.4 (Kahl et al., 2021), the most updated version at publishing time, which will facilitate further use of our data. Once the annotation of the entire audio file was completed, the annotations were exported in .txt format with the exact same name as the audio file.

Data Preprocessing

To standardise the data generated by the different contributors, we took the following steps. First, we checked and modified, whenever required, the file names to provide exactly the same names (besides the extension format) for both recordings and annotations, as in the following example:

"*SITE*"_"*Date*"_"*Time*".wav

where "*SITE*" is a 3-6 letter acronym (all in capital letters) identifying the recording site and whose metadata information can be found in Tables 2 and 3. "*Date*" refers to the year, month, and day when the recording was collected, and "*Time*" refers to the hour (24h format, local time of each site), minute and second of the starting time of the recording. For example, the file "HONDO_20231104_170500.wav", identifies a recording (due to *.wav* format) made in the HONDO site, recorded on the 4 of November 2023 whose starting recording time was five minutes past five of the afternoon. Hours are always expressed as local time. Likewise, the file "HONDO_20231104_170500.txt" refers to the audio annotations made to the recording cited above.

Class III. Data set status and accessibility

A. Status

1. **Latest update:** 29 December 2024

2. **Latest archive date:** 29 December 2024

3. **Metadata status:** Last update 29 December 2024

4. **Data verification:** Last update 29 December 2024

B. Accessibility

1. **Storage location and medium:** The original dataset, along with any updated versions and complementary material, can be freely accessed in Zenodo at https://doi.org/10.5281/zenodo.14191524. The data are provided for public use and can be used for research purposes.

2. **Contact persons:** Cristian Pérez-Granados[1] & Esther Sebastián-González[2],

[1] Biodiversity Conservation and Management Programme, Forest Science and Technology Center of Catalonia (CTFC), 25280 Lleida, Spain. cristian.perez@ctfc.cat.

[2] Department of Ecology. University of Alicante, Ctra. San Vicente del Raspeig sn, 03690 San Vicente del Raspeig, Alicante, Spain. esther.sebastian@ua.es

3. **Copyright restrictions**: The dataset is published under a Creative Commons Attribution Non Commercial 4.0 International copyright.

4. **Proprietary restrictions**: Please cite the data paper accordingly when using it

a. **Citation**: Pérez Granados et al. 2025. WABAD: A World Annotated Bird Acoustic Dataset for passive acoustic monitoring. Ecology

Class IV. Data structural descriptors

A. Data set file

1. **Identity:**

The WABAB includes 4,298 raw audio files (5,044 minutes annotated) and their associated 4,298 annotation files. Audio files are provided in .wav format and have not been standardised, harmonised or transformed, thus allowing future users to either process the original audio files or transform them (e.g., resample, downsample, stereo to mono). Nonetheless, we provide metadata information of each audio file regarding the location, type of recorder and recording parameters employed during recording. Audio and annotation folders are organised within zipped recording site folders. Within each recording site folder, there are three subfolders, one folder with the audio recordings ("Recordings") and the other two folders with the audio annotations in two different formats ("Raven Pro annotations" and "Audacity annotations"). We provide the audio annotations in two different formats aiming to allow users to open the annotations in Raven Pro, which is a commercial software (Bioacoustics software 2014), but includes a free lite version (Raven Lite), and in Audacity (https://audacityteam.org/), which is a free audio software. Both software are commonly used by the public and researchers and allow users to create, open and modify annotations of audio files. The WABAD has also three separate files: 1) one .csv file ("Metadata.csv") with all information available regarding metadata collected for each recording site, 2) a second .csv file ("Pooled annotations.csv") with all annotations into a single file to facilitate searching annotations, such as looking for a target species, recording site, country, or biome, and 3) a pdf. file ("Species list.pdf") with a list showing the number of annotations and recordings where each species appears in WABAD (species ordered alphabetically). All the information included in the Metadata file also appears in this document (Tables 1-3), but has been added as an excel file into the Zenodo link to facilitate the search of information.

2. **Size**:

The WABAD comprises 4,298 raw audio files and their associated 4,298 annotation files. A total of 5,044 minutes are annotated, which include 90,662 annotations of 1,147 different bird species belonging to 579 genus, 139 different families and 23 orders. The number of annotations greatly varied between species. Indeed, the 100 species with the largest number of annotations (8.7% of the species in WABAD) represent 52,307 out of the 90,662 annotations (57.7% of the total). The number of annotations for the 20 species with the largest number of annotations and two graphs showing how the number of annotations are distributed among species can be found in Figure 2. The complete list with the number of annotations and recordings where each species is annotated can be found in the "*Species list*" file, in Zenodo at https://doi.org/10.5281/zenodo.14191524

3. Format and storage mode:

Each acoustic dataset is uploaded in a separate folder, which includes the audio files (in .wav format) and the corresponding annotation files (.txt format), both in Raven Pro and Audacity formats.

4. **Header information**:

See Variable Information below.

B. Variable information

The information of the annotation files varies among whether the annotations were prepared

for Raven Pro or Audacity.

Raven Pro annotations contain eight columns with the following information (Figure 3):

Selection: ID of the selection

View: Whether the information comes from the spectrogram or from the waveform

Channel: Channel of origin of the recordings

Begin Time (s): Start second of the selection

End Time (s): End second of the selection

Low Freq (Hz): Lowest frequency of the selection

High Freq (Hz): Highest frequency of the selection

Species: Species scientific name

Each annotation in Audacity is in two consecutive columns, the first column refers (following the prior nomenclature) to the Begin Time (in s), the End Time (in s), and the Species, and in the next row, which starts with a "\", is the Low Freq (in Hz) and the High Freq (Hz, see Table 4).

Table 4: Example of the structure of a file containing annotations in Audacity. There are no headings in Audacity format, the first column refers to the time measures (in seconds) and the species scientific name, while the second row shows the frequency limits. This file example (without headings) contains two vocalisations of different species. The first annotation belongs to the species *Nyctibius griseus*, which was annotated from the second 15.142 to 17.650 and from a low frequency of 125.5 Hz to 1933.1 Hz, and a second annotation of *Nyctibius grandis* between the second 39.707 and 42.547 of the recording, and with a low frequency of 500.6 Hz and with a High Frequency of 2184.1.

Class V. Supplemental descriptors

A. Data acquisition

1. **Data forms or acquisition methods**: See *Experimental or sampling design* section.

2. **Data entry verification procedures**: To standardise the annotations provided by different annotators, we first verified that the bird species name was added to a new column called “Species” and modified the column name if not. Secondly, we ensured that the scientific names provided by the experts followed the Clements list (Clements et al. 2021) nomenclature. To verify the nomenclature, we used a script in R (v 4.4.0) that compares the annotation names provided by the experts with the list of bird scientific names in Clements et al. (2021). Non-matching species names were checked and changed appropriately.

B. **Quality assurance/quality control procedures**: A subset of the files sent by each of the collaborators was opened in Raven Pro by CPG and ESG, and they were revised for the minimum requirements described in “Audio Annotation” and “Data Preprocessing” sections.

C. **Computer programs and data-processing algorithms:** To verify the nomenclature used by expert annotators and that in Clements et al. (2021), we used a script in R (v 4.4.0) to match both nomenclature and changed it, whenever needed, to follow the Clements list.

D. Archiving

1. **Archival procedures:** The complete audio files, their annotations and associated metadata are available as Supporting Information and are also provided in Zenodo at https://doi.org/10.5281/zenodo.14191524.

E. Publications and results:

Part of the recordings of this dataset have been used for the following publications and preprints as listed in Table 1:

Bombaci, S., L. Pejchar, and J. Innes. 2018. Fenced sanctuaries deliver conservation benefits for most common and threatened native island birds in New Zealand. Ecosphere 9:e02497.

Bota, G., Manzano-Rubio, R., Catalán, L., Gómez-Catasús, J., and Pérez-Granados, C. 2023. Hearing to the unseen: AudioMoth and BirdNET as a cheap and easy method for monitoring cryptic bird species. *Sensors* 23:7176.

Darras, K. F. A., Rahman, D., Sugito, W., and others. 2018. Birds of primary and secondary forest and shrub habitats in the peat swamp of Berbak National Park, Sumatra [version 2; peer review: 2 approved]. F*1000Research* 7:229.

De Araújo, C., Lima, M. R., Albuquerque, P., Alquezar, R. D., Barreiros, M., Jardim, M., Gangenova, E., Machado, R., Phalan, B., Roos, A., Rosa, G. L. M., Saturnino, N., Simões, C. R., Torres, I. M. D., Varela, D., Zurano, J. P., Marques, P. A. M., and dos Anjos. 2024. Acoustic monitoring of anurans and birds in tropical biomes. *Biotropica* 56:e13307.

Díaz-Vallejo, M., Chaparro-Herrera, S., Lopera-Salazar, A., Castaño-Díaz, M., Correa, R., and Parra, J. L. 2023. Use of acoustic monitoring to estimate occupancy of the Antioquia Brushfinch (*Atlapetes blancae*), a critically endangered species, in San Pedro de los Milagros, Antioquia. *Journal of Field Ornithology* 94:2.

Duarte, M. H. L., Sousa-Lima, R. S., Young, R. J., Farina, A., Vasconcelos, M., Rodrigues, M., and Pieretti, N. 2015. The impact of noise from open-cast mining on Atlantic forest biophony. *Biological Conservation* 191:623–631.

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F. History of data set usage:

Data has not yet been used by any external user.

Declarations

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Open Research statement:

The complete audio files, their annotations and associated metadata are available as Supporting Information and are also provided in Zenodo at https://doi.org/10.5281/zenodo.14191524.

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Tables

Tables 1 to 4 are available in the Supplementary Files section

Figures

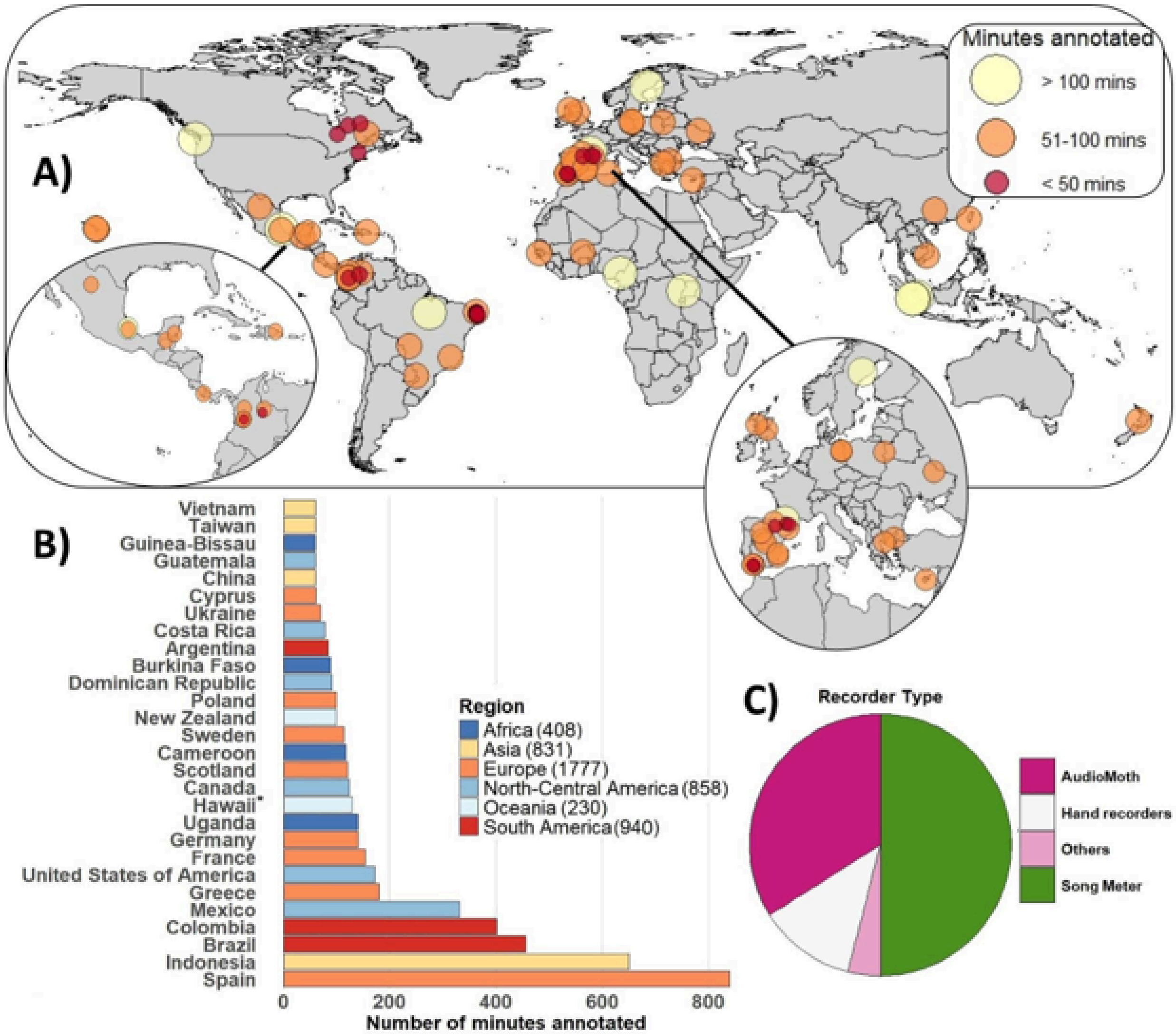


Figure 1

Panel a. Global mapping of recording sites. Colours and size of dots refer to the number of minutes annotated per recording site. The small circles show the location of recording sites in Europe and Central America. Panel b. Number of annotated minutes per country and region. Colours of the countries refer to different regions. * Hawai'i although belongs to the United States of America is shown separately since it belongs to Oceania. Panel c: Pie chart showing the proportion of different types of audio recorders used across recording sites.

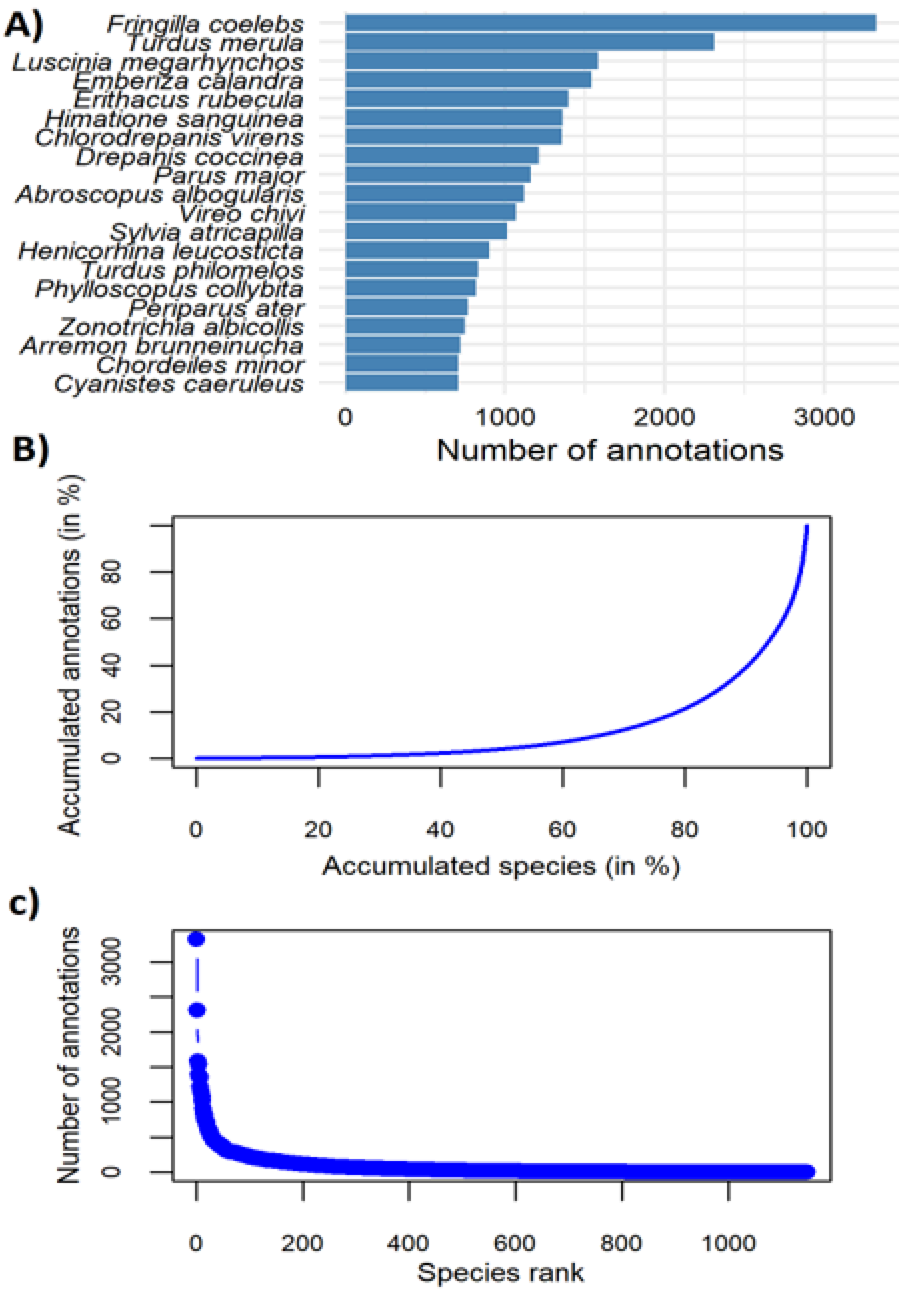
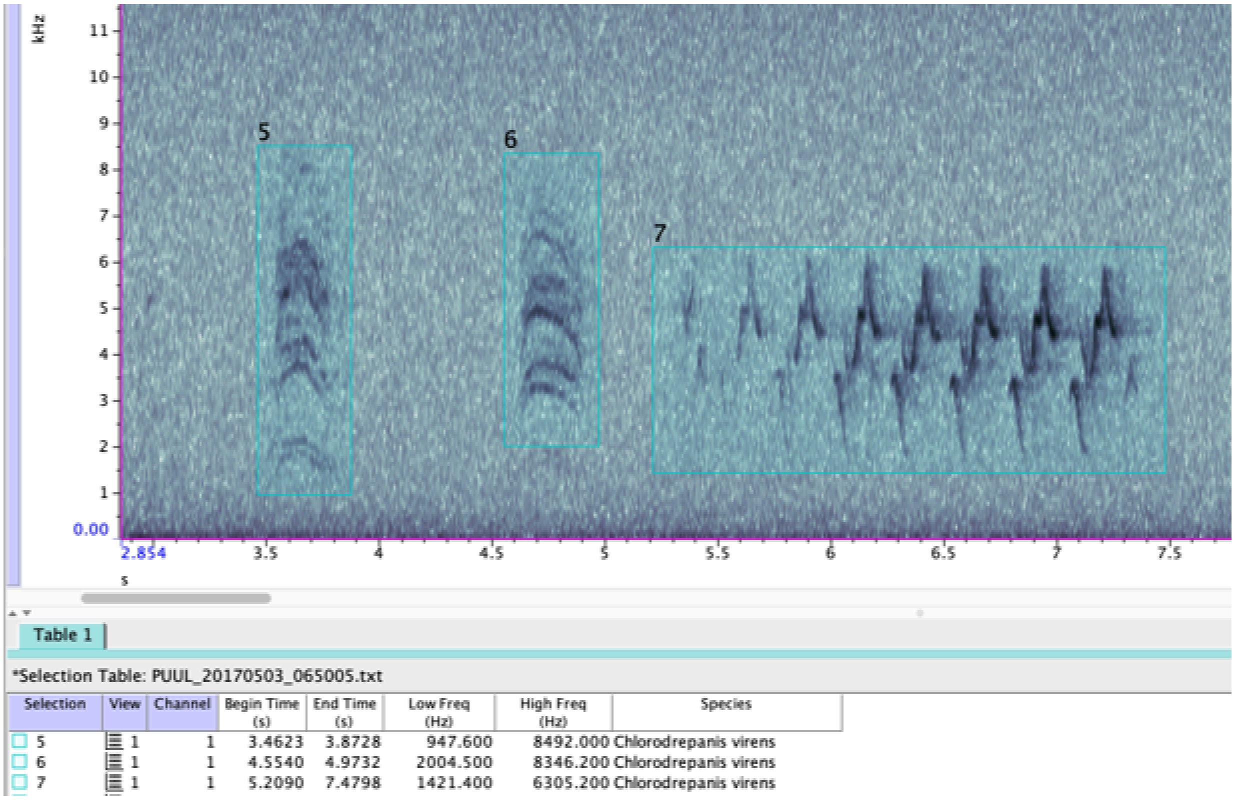


Figure 2

Distribution of the number of annotations across the dataset. Figure 2a shows the number of annotations for the 20 most common species in WABAD. Figure 2b illustrates the cumulative distribution of annotations across species. This curve reveals that a small number of species account for a large proportion of the annotations. The rank-abundance plot (figure 2c) shows the relationship between species rank and the number of annotations. Species are ranked from most to least abundant number of annotations, illustrating a steep decline in the number of annotations as rank increases.



Selection	View	Channel	Begin Time (s)	End Time (s)	Low Freq (Hz)	High Freq (Hz)	Species
5	1	1	3.4623	3.8728	947.600	8492.000	Chlorodrepanis virens
6	1	1	4.5540	4.9732	2004.500	8346.200	Chlorodrepanis virens
7	1	1	5.2090	7.4798	1421.400	6305.200	Chlorodrepanis virens

Figure 3

Annotations made with Raven: the top part is a 4 seconds long representation of a spectrogram of the sounds in a recording, whereas the bottom part shows the manual annotations identifying all bird sounds present in the recording. The annotations encapsulate each bird vocalisation based on their frequency and time. Vocalisations of the same species that are less than 1 second apart could be contained by a single annotation. Each annotation contains an ID number (Selection), whether the information is for the spectrogram or the waveform view (View), the begin and end time, the low and high frequencies and the scientific name of the species based on the Clements list (Clements et al. 2021).

Supplementary Files

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