

bcAdmin 3.0 - Manual

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1. Introduction

Thank you for choosing bcAdmin 3.0. bcAdmin will make working with batcorder recordings as well as other bat call files a lot easier. It takes away most of the organising and supports you when analysing. It is fine tuned to work with the batcorder and presents an elementary part of the batcorder-system. It is the database that stores information and does intelligent analysis.

The application is primarily focused on the management of recordings and their meta information as well as the output of data compilations based on the raw data. In addition it automatically searches your recordings for bat calls, and takes measures of all found calls so batldent can identify bat species. The meta information belonging to recordings are stored in a database-like file and can be filtered and otherwise manipulated.

bcAdmin was growing tied to the batcorder from its first release nearly 10 years ago. It had to be able to cope with ever new arising tasks. bcAdmin 3.0 is definitely the most powerful version we released and contains many new functions that were shaped from your input.

2. Installation

System requirements for running bcAdmin 3.0 are an Apple Mac with Intel-CPU running Mac OS 10.7 or newer. We recommend at least 4GB of memory. After downloading the application zip archive, extract it into your Applications folder. If you are already using an older version of bcAdmin, we recommend you first rename. To use the automatic identification you'll need batldent and its components.

3. New in bcAdmin 3

We're going to list some of the new features of bcAdmin 3, which won't fit well in other chapters of this manual. This chapter also may help bcAdmin 2 users to quickly get into bcAdmin 3.

3.1. Working on multiple database simultaneously

The limitation that only one single database can be opened was removed. Now you can open as many database files as you want and work on them. We thus recommend to structure your data not only in projects within bcAdmin, but also to use different database files.

3.2. Copy & Paste

In contrast to bcAdmin 2 you now can use copy&paste to copy data between database files. That way you can quickly duplicate within one database or exchange between databases.

3.3. Context-menus

Many UI elements in bcAdmin 3 will show a context menu when right clicked. The manual will not document all interface elements that have a context menu, thus, try out a bit.

3.4. Still missing in bcAdmin 3

Some few features of bcAdmin 2 don't yet have made their way to bcAdmin 3 for various reasons. One that is missing is the creation of CDs from selected recordings or the upload to our server. Whenever you encounter any other function still missing, that you need, please give us a signal.

Also some features were planned, but omitted for the first release of bcAdmin 3. They will get added eventually.

4. Overview of bcAdmin 3.0

4.1. What does bcAdmin?

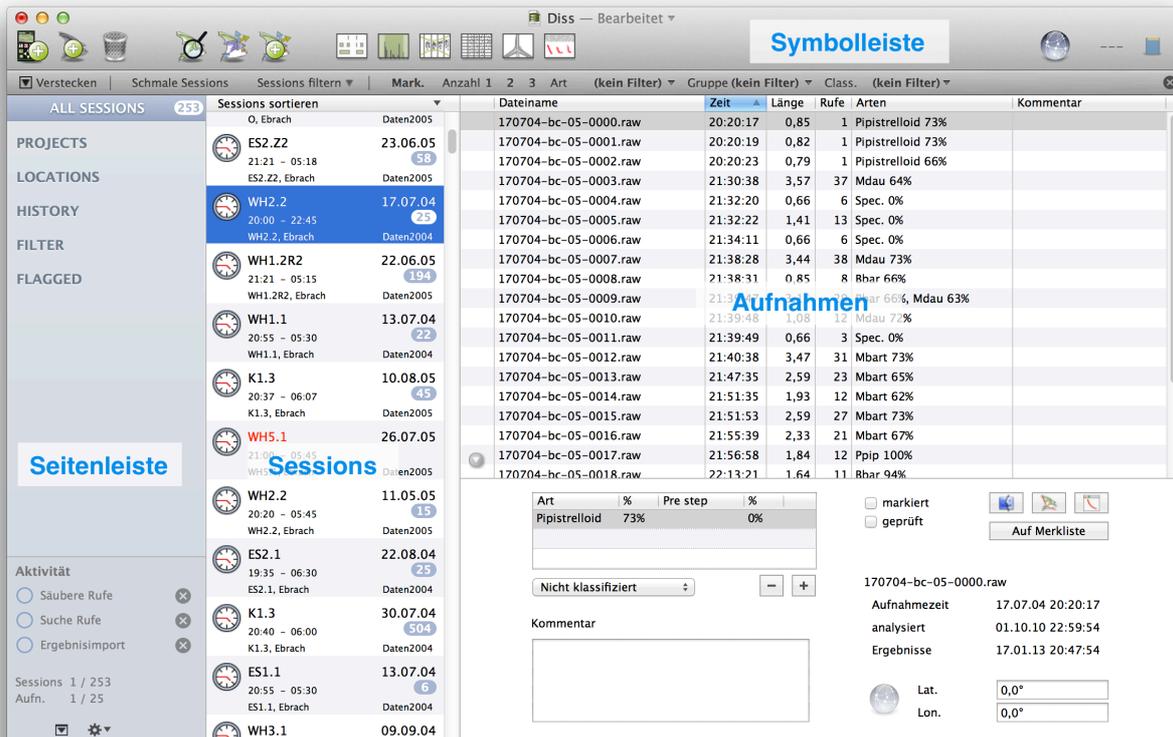
bcAdmin is designed to manage and analyse your bat call recordings. It combines a database with a sound analysis tool and creates tables and graphs for your reports. It works together well with batIdent and thus can obtain automatic species identification through it. That way you quickly get per species activity patterns and reports. In short: no need to switch between sound analysis app and spreadsheet app - it's all within bcAdmin.

Since many steps in the analysis process are automated within bcAdmin, working with large datasets as created by passive recording systems is at least possible in a meaningful way. Only due to the objective call measurement and identification a basis for comparison of locations and nights is possible. Whether you're doing acoustic monitoring, comparison of activity for consulting or diversity indices - bcAdmin is the optimal tool for your work.

While the app is optimised for batcorder recordings, it works well with files of other systems as well. Nevertheless, many devices produce recordings with echoes or otherwise low sound quality. For these taking of automatic measurements may give less viable results or no at all.

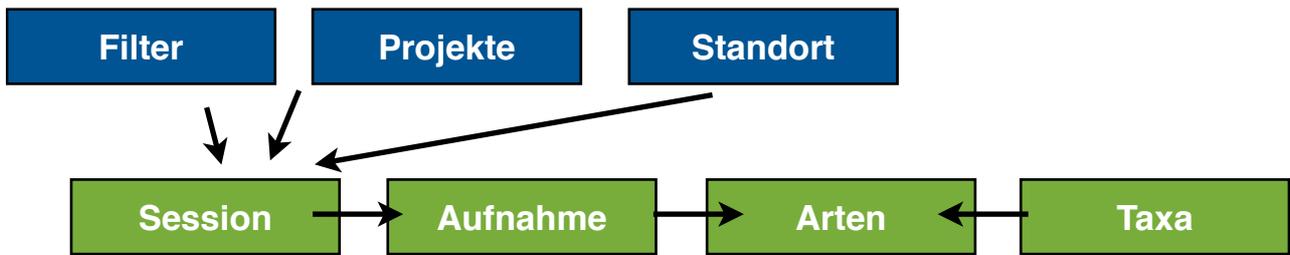
4.2. Short functional overview

Recordings are connected in bcAdmin to meta information regarding the sampling efforts (sessions) and location. Sessions and recordings may be filtered or grouped based on this data. Analysis of calls is done using a unique and lightning-fast algorithm. It works in batch-mode, finds every call matching your settings and takes measurements. All found calls can also be displayed on a per file basis and you can manually correct calls misclassified by batIdent (working for European bat species only). Per recording a maximum of three species entries is possible. The comparison of data is possible due to the objective approach of call and species identification. Using these results calculations of activity based on recording count, recording duration or other activity groupings can be done. Different functions also visualise your data. In addition you can export data and do further calculations or graphs in any other application you like.



4.3. Data structures

Before working with bcAdmin it may be useful to understand its concept of data management. The basic unit in bcAdmin is the **Session**. It includes the recordings of **one device and one night**. This data container is used throughout the program for calculations of activity and all data should be organised that way. You can group sessions in Projects for getting a better overview. Within a Session recordings are collected. To keep the database performant, the recordings themselves are not stored in the database, only meta-information and a link to the file is included. So, **the recording files are kept outside the database on your hard disc**. The same accounts for the measurement files, these are stored also on disc, parallel to the recording files. So **after importing recordings into bcAdmin, you should not delete the files**. Each Session keeps a link to the path of the recordings. This **filelocation** can be changed if files are moved for example from internal to an external disk. We chose this system, since then you can easily backup files and other applications like bcAnalyze can easily access the recordings and related files. After importing and analysing the recordings you could delete the recording files to save disk space. While that is tempting, we recommend to not delete these files, but maybe first backup them. If later new tools allow better analysis you can re-analyze your data. In addition to Sessions and Recordings other objects like Locations and Projects are stored within the bcAdmin database. Sessions can be connected to these objects and thus be grouped.



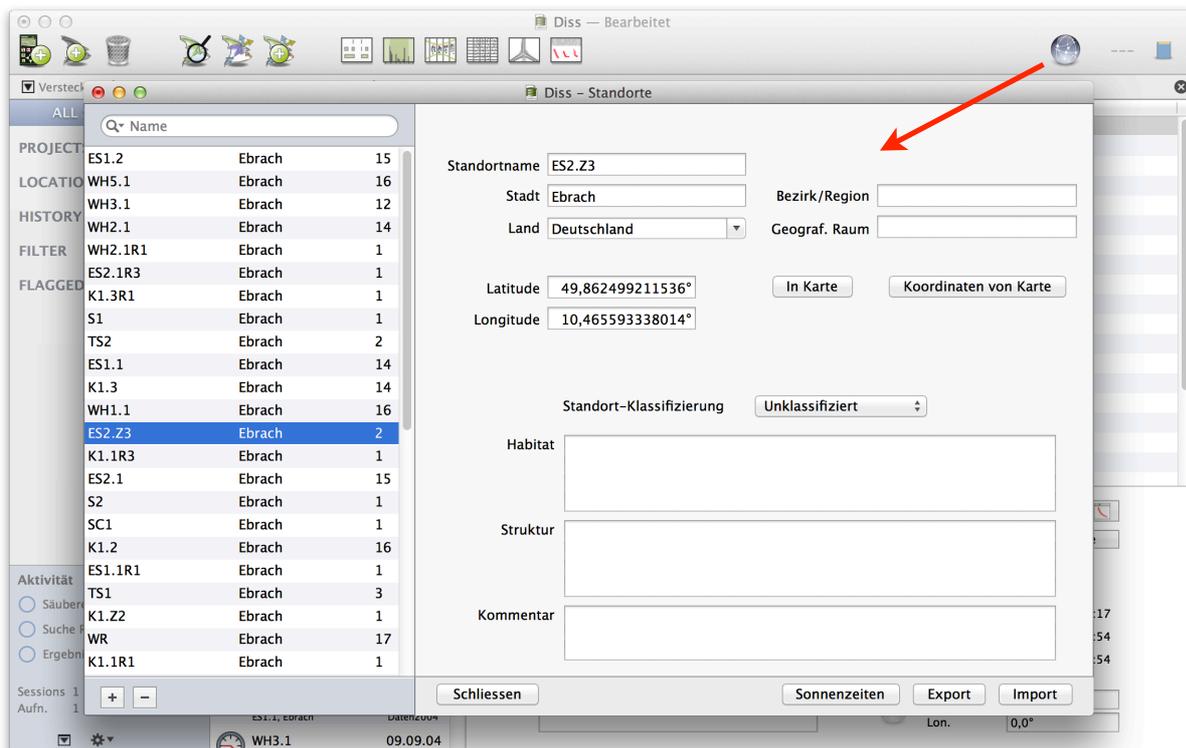
To import results bcAdmin holds a list of all species results of batIdent. A complete overview is given in the Taxon-Editor of bcAdmin. There you can also change display colors for selected species.

5. Creating database entries

As mentioned above, information is organised in Session, Project and Location objects within bcAdmin. When importing recordings and thus creating a new session, the addition of a project or location is not necessary. It can be done later on as well. Nevertheless, to utilise some functions, locations are necessary. We thus recommend to not be too lazy, but keep your database up to date. Sessions can be connected to locations and projects any time. The following chapters will shed some more light on the data structures and show how to import data easily.

5.1. Locations

If the batcorder is used for a single or multiple nights for passive, stationary monitoring information for this location can be stored within bcAdmin. A session then can be connected to that location. To create new locations or modify existing ones choose **Window -> Locations** and a window opens. There you get a list of all available locations. In addition you can filter locations and edit selected locations. For referencing a location throughout bcAdmin it needs a name and entry for closest city.



Coordinates

Coordinates can be added in decimal degrees (WGS84). Using these coordinates bcAdmin can calculate for example sunset and sunrise times. An export of data based on the coordinates as KML file is possible as well.

Sun times

This function gives a graph showing sunset and sunrise times. It may be useful in planning batcorder timer setup in advance.

Export/Import

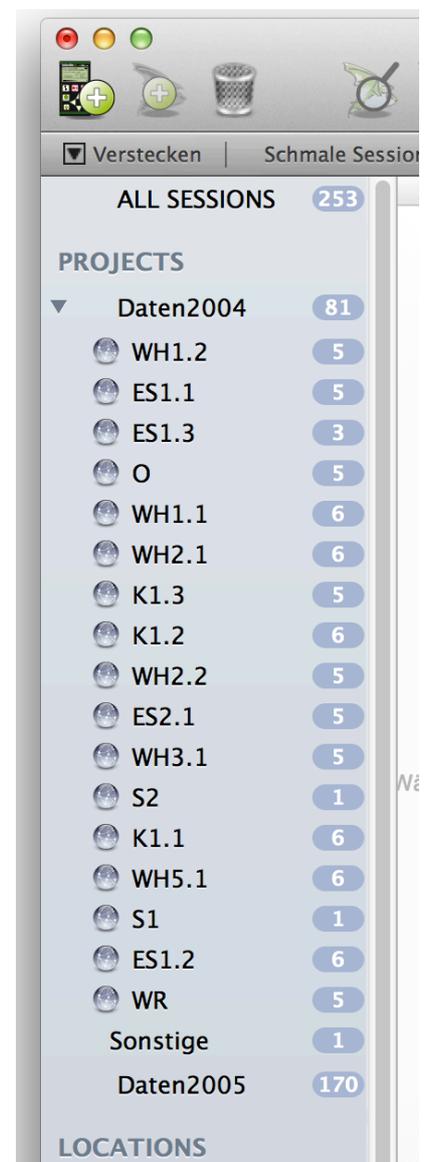
You can export and import KML and CSV files.

5.2. Projects

Projects offer the possibility to organise your sessions similar to your work projects. Projects are shown and maintained in the leftmost column of the document window. Per right-click or with the **+**-button (window bottom) projects and groups can be created.

Next to each project a number indicates the number of sessions contained within the project. After you have selected a project, the session table will reload and only sessions belonging to the project will get displayed. You can add folders for organising your projects. Sessions can be assigned only to projects and not to folders.

A new feature of bcAdmin 3 is that projects can now create subgroups either dynamically or manually. These subgroups are a list of all locations and flag states of sessions within this project (see screenshot). The default setting is that you have to manually initiate the subgroup creation via the context-menu of a project. You can also set bcAdmin to automatically create these groups whenever the project groups is opened. This may take a short moment and lead to slower animation of opening the project. So, only activate the automatic feature if you don't mind the lower animation quality. If you want to delete the subgroups again, just open the context menu, press the **alt** key and click the corresponding menu item. The subgroups will be used best for projects with either many locations or many different flag states.

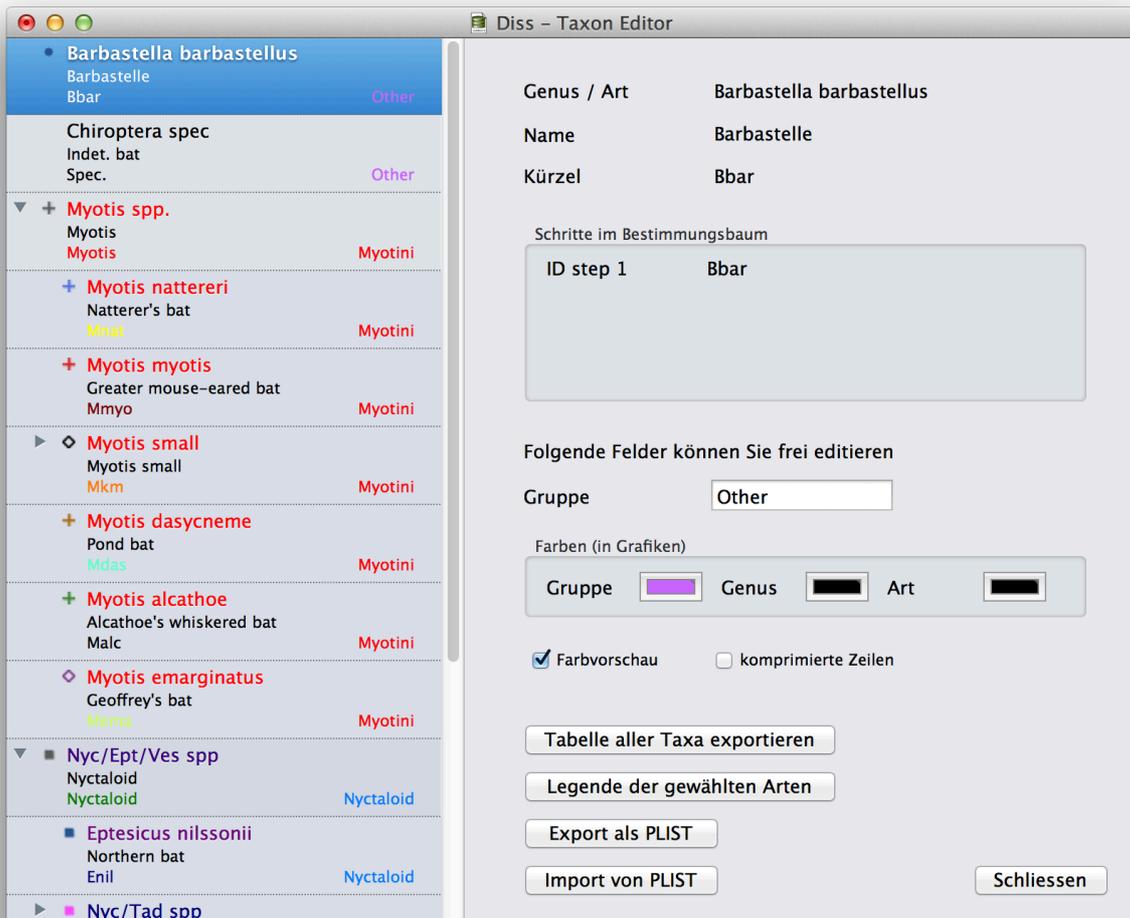


5.3. Taxon-Editor

The Taxon-Editor gives an overview of all species integrated into bcAdmin and their tree like organization. It is taken directly from batIdent and

resembles the id process. For each taxon entry colors as well as the group can be chosen freely.

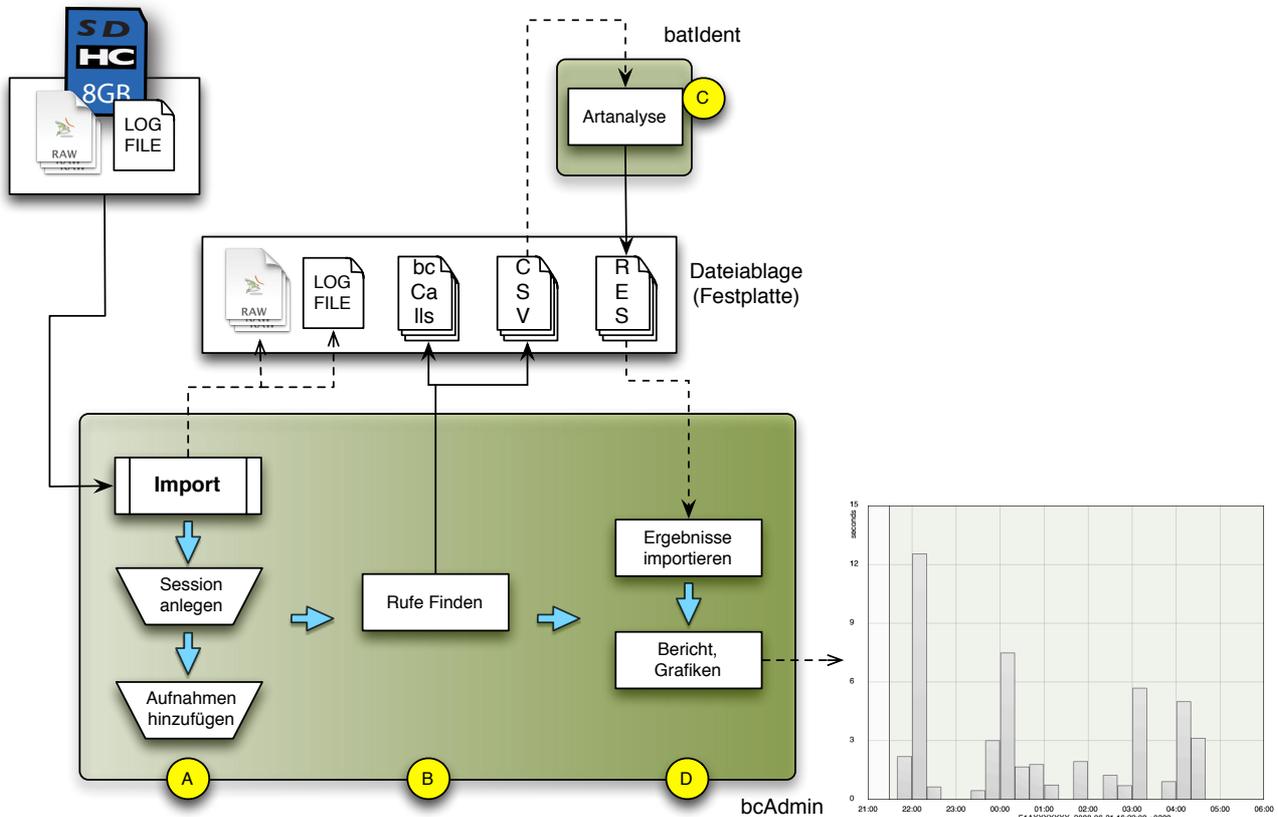
Furthermore an export feature allows to create a HTML, RTF or DOC file containing a table of all species. This can be used in reports or other documents. In addition you can chose a set of species and create a legend file to accompany any graphs created with bcAdmin. If you have changed colors of species, genera or groups and want to use these on other computers or as a preset for any new document in bcAdmin, you can export a PLIST file containing these as a reference.



6. Typical workflow

6.1. Workflow overview

The following scheme displays the typical steps when working with bcAdmin:



- ❖ A: Creation of Session and recordings. This can be done manually or, as recommended, automatically via the batcorder logfile.
- ❖ B: Finding calls and creating measurement files.
- ❖ C: Statistical species identification using batldent.
- ❖ D: Import of identification results in bcAdmin as well as control of results. Data summarisation as well as raw data can be exported in various formats.

bcAdmin manages and saves all entries and results for sessions and recordings in a database file with the extension bca3sql. When creating sessions, adding recordings and running their analysis it will read/write additional files:

- ❖ **recordings**; audio files from your recorder
- ❖ **LOGFILE.TXT**; batcorder logfile with runtime informations logged by the batcorder
- ❖ **call files .bcCalls**; time-frequency measurements of all calls of a recording
- ❖ **measurements .csv**; measurements taken for batldent id process
- ❖ **result files .res**; batldent result files

The logfile is used for automatic import of recordings and their organisation in sessions. The recording files are read when the call finder is started as well as when time stamps and recording lengths are read in. The call files are used to display the call preview in the File Browser. Measurements are used by batIdent which creates the .res files for results import into bcAdmin. The best approach is to organise all files belonging to a single session within their own unique folder.

6.2. Import from logfile

For creation of sessions and import of recordings the best approach is to utilise the import from logfile feature of bcAdmin. That way recordings are copied (if necessary) from SDHC card, sessions are created and recordings added. All available information from the logfile is automatically entered into the database. This means you get start and stoptime as well as batcorder settings created within bcAdmin automatically.

The following entries of a session are created automatically when importing from logfile:

- ❖ Session-identifier: batcorder filecode is used
- ❖ Sample date: start/stoptime and sampling time are taken as recorded by the batcorder
- ❖ filelocation: filelocation is set to the folder the recordings are imported from or copied to (if logfile resides on the sdhc card)
- ❖ batcorder-settings: the settings threshold, posttrigger, quality and critical frequency are set

Import of files from SDHC-card

Whenever a batcorder SDHC-card is inserted in the computer, bcAdmin recognises it and activates the SDHC toolbar item in the upper right of the window. Using this button you can import files or format the SDHC-card.

When import is started the logfile is read and parsed. The results are displayed. For box or wind turbine kits the average GSM quality is indicated (the number of tries for sending are counted). If the Mac is connected to the internet a check for firmware updates is done. If a newer firmware is available, the firmware version in the upper right is coloured red.

The import dialog list all extracted sessions in a table. For each session available information are shown. In addition a symbol indicates the usage mode of the batcorder and gives hints if cards were full or battery empty.:



AUTO mode



wind turbine kit



AUTO+TIMER mode



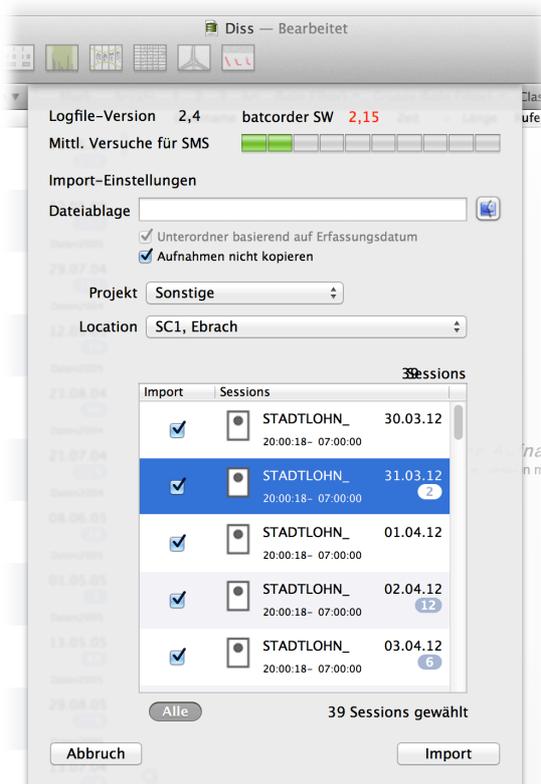
box extension



logfile problem

If a logfile problem was indicated for some sessions not all recordings may get copied. You should check manually, if the recordings were copied completely. If such error occur regularly, please exchange the SDHC card.

The dialog allows to select which sessions to import. You can additionally already set project and/or location for all sessions. Since the files reside on SDHC-card, you have to set a folder the files should be copied to before importing them. Note that we recommend to set the option to create a folder for each session named after the sample-date. Check each session you want to import using these settings and start the import. That may take some time, depending on the number of files that have to be copied to disc.



Import from logfile on hard disc

If you have already copied your recordings to hard disc, you still can use the logfile import. Note that the logfile and the recordings have to be located in the same way they were found on card. If you introduced subfolders, the logfile import may not be able to find the recording files.

You can start the import via **Sessions -> Import from logfile**. Next a file chooser dialog appears and you have to select the logfile you want to use for import.

The procedure to import files is as described above. The only difference is, that you'll not need to set a filelocation for copying files to. If you want bcAdmin to organise the file structure, you nevertheless can activate file copy.

When recordings get imported that way, their timestamp is set from the file creation date. If files were copied to hard disc, they may have received a new timestamp. If that is the case, you can later extract the correct timestamp from logfile.

6.3. Manual creation of sessions and recordings

There may be situations when you can't use the automatic import of sessions and recordings. For example if you have a collection of non-related files or if you are using another recording device that doesn't create a logfile. We recommend you setup a session with

necessary information and add recordings to it manually. That way you can use all or most of bcAdmin features with these recordings.

Create a session

Either press the create session toolbar item (the batcorder symbol) or choose **Sessions -> Add** to create a new session entry. Also note that you can duplicate existing sessions to get a starting point. It will have most of the source sessions details filled in already.

Note: Duplicating a session will neither duplicate the files nor the filelocation.

Next set a correct filecode or identifier and set the correct sample date. Also make sure start- and stoptime are set. If necessary adjust the batcorder settings.

Add recordings

After you created a new session it should be already selected in the table of sessions. You can then add recordings either via the toolbar item or via the **Session** or **Recording** menu, or by dragging files from a Finder window onto the session entry in the middle table. If there is already a filelocation set for the session that differs from the filelocation of the added recordings you'll get a warning and the process is stopped. Please first set the session filelocation to the folder the new recordings are located at. bcAdmin supports only raw and wav files.

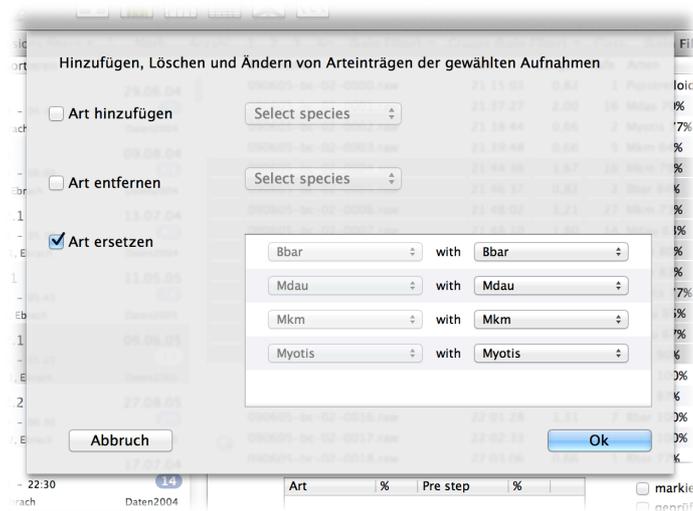
When importing recordings the timestamp in the database for each recording is taken from the file creation date. This may have been changed due to emailing, copying or uploading files. If you still have a logfile at hand, bcAdmin will be able to reset the timestamp from there. For some wav recordings you will be able to extract recording time from the filename.

6.4. Finding calls

After adding recordings initially the recording stable list only a few entries, but no information on count of calls or species. Only after you initiated the search for calls, you will get a number of calls found, if any were found. Also you're able to see calls in the File Browser now. The call finder works on all selected recordings.

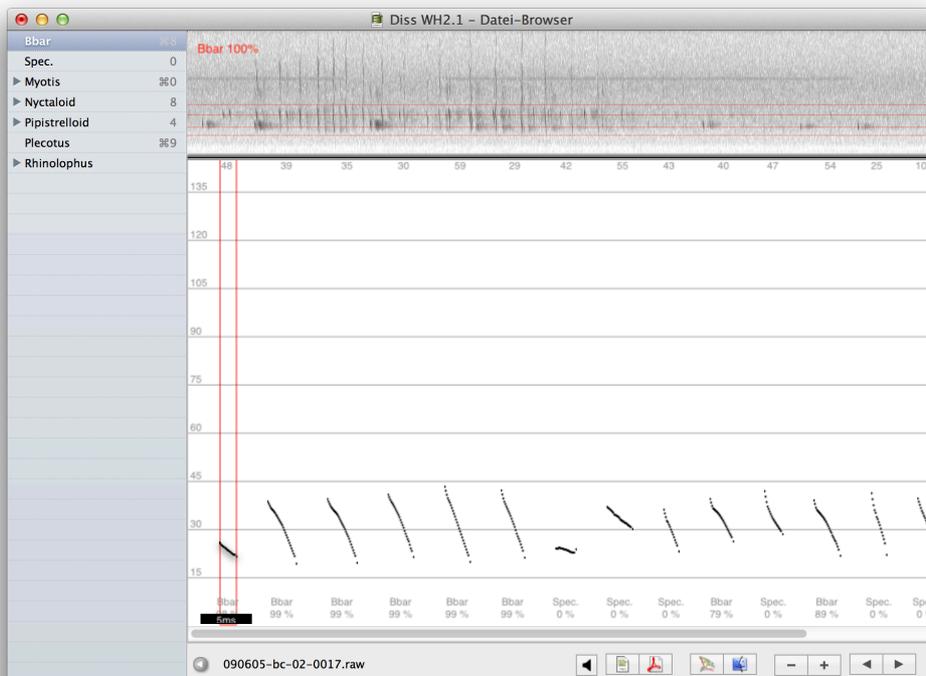
Tip: Select all displayed recordings by pressing cmd/⌘ and A.

The algorithm to find calls and extract measurements is lightning fast, and unique. Most settings for this algorithm are set to an optimum value, optimised for batcorder recordings. Still, as user you can change the threshold, which equals the sensitivity.



6.6. Call display and File Browser

Using the File Browser you can quickly display calls and an overview sonagram of selected recordings. Open the file browser using the corresponding toolbar item or the command **Recordings -> File browser**. In the newly opened window you see a display showing the measurements per call (frequency over time; call intervals are cut-out) as well as an overview sonagram displaying up to four seconds of sound (see preferences). Using the arrow keys on your keyboard you can move up and down the recordings table and quickly scan your recordings. If batldent already identified species, you can see below each call an entry displaying species and probability for this single call.



Additionally the first one to four seconds (settable per user preference) are displayed as sonagram above the calls. Intervals are show as well in the sonagram. The sonagram is always stretched to fill the window width.

Note: The results should be read as per call results and not be interpreted as the id result for the file. The results of each single call are accumulated and an overall result is calculated. What you see for the per call results is typical for statistical noise, thus species showing up you may not have expected.

Navigation through recordings is possible using the arrow buttons as well as the arrow keys on your keyboard. This allows you to screen a large number if recordings very quickly. It helps to control the quality of identification and find sequences with social calls or feeding buzzes. Using the +/- buttons you can set a different zoom for the calls. Yet, the standard zoom should usually work best.

By clicking the play or speaker button below the call display you can playback either in ten-time delayed mode (also by pressing **n**) or with a virtual heterodyne detector (also by pressing **m**).

Export to image

The call display can be exported to an image file or pdf file using the corresponding buttons. PDFs are always saved with the same fixed width, image files adapt their size in accordance with the number of calls.

Shortcuts

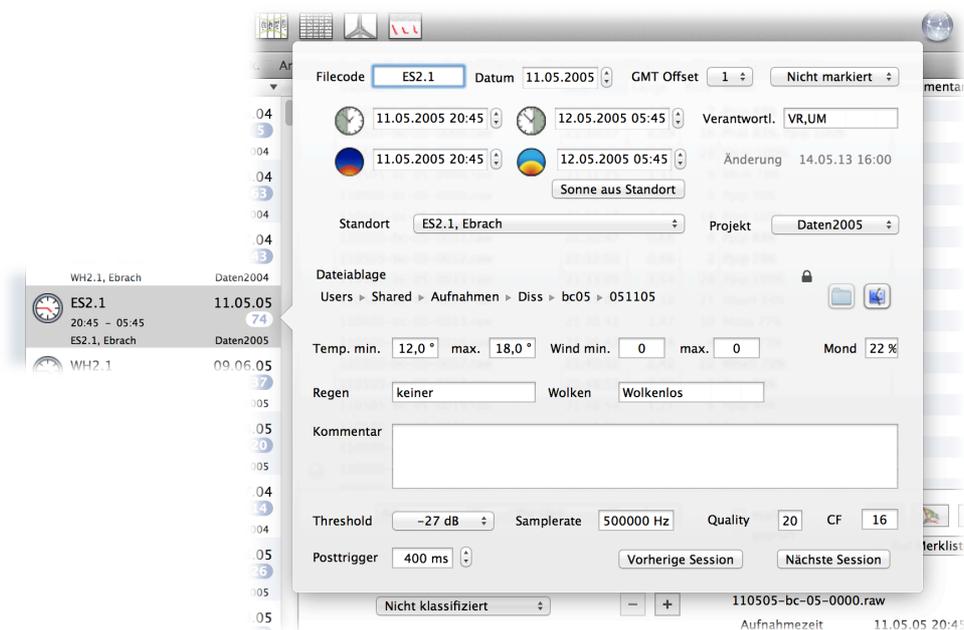
For quickly changing or setting a species for the selected recording, the keys **1 to 0** and **cmd+1 to 0** can be set to a species. That way, when manually identifying a species using the **file browser** (or **while working in the recording table!**), you can quickly set its species entry. If you want to add a species to the existing entry, you can press the **alt** key and the corresponding numbers. The maximum number of three species per recording can not be circumvented that way.

7. Sessions

To allow a quick and simple working with the application, most data can be accessed and changed easily. All session details are accessible easily after double-clicking a session entry in the session table. A popup displays all session details and allows editing all information. More elaborate functions let you access the logfile, delete or add recordings and remove location or project connections. These are accessible via the **Session** menu.

7.1. Editing Sessions

In a previous chapter detailed instructions were given on how to import sessions manually or from logfile. Since not all settings for a session may be available at its creation time, it may be necessary to add details later:



Filecode: This acts as name of the session and forms a unique identifier together with the date. Usually this set to the same value as on the batcorder. If you use other recording devices, you can code a location or project here.

Date: The date the sampling began. Acts as sample date throughout the application.

Project: Sessions can be grouped in projects.

Status: Sessions can be marked with a status or flag.

Sampling from / to: Timestamp for start and end of sampling. Is used by some functions for calculating activity indexes.

Editor: You can add the person responsible for data collection here.

Filelocation: At this folder all recordings and related files are searched for. By unlocking this field you can change the filelocation, for example after the recording files have moved.

Furthermore these details can be set per session:

Location: This dropdown gives a list of available locations to connect the session to. If you have already chosen a project for this session, only locations already connected to sessions of this project are shown. You can show all locations.

Sunset/-rise: Timestamp for sunset and sunrise. These are used for some graphs as well as for some calculations and should be filled in after best knowledge. If a location with coordinates was set these values can be calculated.

Rain, Temperature: Both types of values have no special input format and are currently not used by other functions. They are more for your own reference. Since the batcorder 3 does automatic logging of temperature while recording bats, the values get extracted automatically when importing recordings via logfile. You can get a graph showing the temperatures over night. If temperature data is available a small icon with a thermometer is displayed. This acts as button to open the temperature graph.

Comment: Any comment for this session can be added.

batcorder-settings: If you're working with the batcorder, your settings should be added here. For other recording devices or file formats, the corresponding samplerate should be set. Depending on the recording quality, you may adjust threshold and quality settings.

7.2. Managing sessions

Selected sessions can be edited per double-click. Selection of multiple selection is possible by holding down **cmd key** when selecting. If you want to select a whole continuum of sessions, select the first, then hold **shift key** and select the last one. If more than one session is selected, most actions operate on the multiple selected sessions.

After some time of batcorder usage you may find your list of sessions grown a lot. Thus, finding sessions may get painful. bcAdmin offers some ways to speed up finding sessions.

Sorting

Sessions can be sorted according to various criteria. Click the session column header and select the sort parameter you want.

Filter

You can quickly filter sessions by type of session (auto, timer, ...) using the drop-down above the session column. More complex filters can be activated in the left sidebar. You create filters analogue to projects, thus by using the buttons below the sidebar. Filters act dynamically, thus whenever activated by clicking, they perform their filter and filter from all sessions those that fit their predicate. After creating new sessions you will have to reactivate/reselect the filter to see changes.

When creating a filter you should give it a label first. Then you can choose from a variety of fields that can be used for the actual filter process. An explanation of what you can use as filter criteria for various field types follows:

Date entries: You can use filters with daily accuracy.

Strings: Most fields contain string values. Various criteria for filtering strings are available including equality, difference, starting with, ending on etc.

Boole values: They can be set to wither Yes or NO, or 1 and 0 respectively. Fields like marked or audited belong to this type.

Numbers: All values that resemble numbers can be tested for equality or smaller than, larger than, ...

For some fields special ranges of values account:

Details: moon: The value for moon is listed as percentage in the session details. It is thus stored as value ranging from 0 to 1.

Recordings: classification: Recordings can be classified according to four different types. Standard is 0 = no classification. Other values are 1 = normal calls, 2 = social calls and 3 = feeding buzz. Please enter the respective number when filtering sessions that include such recordings.

Above the filter criteria you can in addition choose how criteria are combined and used.

Show logfile

The batcorder logfile contains various information regarding the sampling. Start, end, mode and batcorder settings, as well as errors are reported here. You can browse the logfile to check the batcorder was working properly, or to check recording times (especially useful around DST changes). If the logfile resides at the session's filelocation you can open it via **Session -> Show logfile**.

Changing the filelocation

The correct filelocation is important to find the files belonging to a session. They are needed when searching calls as well as when displaying call displays. Sessions with a missing filelocation or an invalid filelocation are shown in red in the session table. When you are moving a folder with recordings, the sessions pointing there will be drawn in red. You then have to adjust the filelocation, otherwise the files can't be accessed from bcAd-

min. If you have to adjust the path for multiple sessions, bcAdmin will help you as much as it can. It will first determine the common path of all sessions. As long as you have stored and moved recordings in a parallel way, so not randomly, this should be good enough. bcAdmin will allow you to exchange the common old path with the new filepath the sessions have in common.

An example:

Sessions with FILECODE_A, FILECODE_B and FILECODE_C store their recordings in:

```
/Volumes/Macintosh HD/User/batcorder/Recordings/130601
```

```
/Volumes/Macintosh HD/User/batcorder/Recordings/130605
```

```
/Volumes/Macintosh HD/User/batcorder/Recordings/130610
```

The common path thus is:

```
/Volumes/Macintosh HD/User/batcorder/Recordings
```

If you move these folders to an external hard drive as follows

```
/Volumes/EXTERN/Recordings2013/130601
```

```
/Volumes/EXTERN/Recordings2013/130605
```

```
/Volumes/EXTERN/Recordings2013/130610
```

That way the old common path from above will be exchanged with:

```
/Volumes/EXTERN/Recordings2013
```

This method of path replacement is always possible, if multiple sessions are selected when the session details are opened.

Automatic filelocation repair

A new feature of bcAdmin 3 makes the whole process even easier. From the Sessions menu you can choose to automatically fix missing filelocations. That works rather well as long as the files are not deleted from the computer or connected hard drives. It works automatically and will only interact with you if necessary.

The screenshot shows the bcAdmin software interface. On the left, there is a 'Sessions' list with columns for session name, date, and location. Two sessions are visible: 'BCSTANGE' and 'BCRUCK', both dated '09.10.12' and located at 'Transecttest'. A dialog box is overlaid on the right side of the screen. The dialog box has a title 'Letzte Dateiablage' and contains the following text: '/Volumes/Macintosh HD 2/Users/Shared/ecoObs/Hardware/TestTransectRucksac'. Below this, it says 'Neue Dateiablage' followed by a text input field containing the path: '...unkel/Documents/bcAdmin3/TestTransectRucksack/batcorder_an_Stange'. At the bottom of the dialog box, there are two buttons: 'Abbruch' and 'Fortsetzen'. In the background, a table of session data is partially visible, showing columns for session ID, name, date, time, and status.

Session ID	Session Name	Date	Time	Status
01	Lade Sessions ...			
21	BCSTANGE	09.10.12	19:01 - 19:53	No location
30	BCRUCK	09.10.12	19:00 - 19:54	No location

Letzte Dateiablage
/Volumes/Macintosh HD 2/Users/Shared/ecoObs/Hardware/TestTransectRucksac
Neue Dateiablage
...unkel/Documents/bcAdmin3/TestTransectRucksack/batcorder_an_Stange
Abbruch Fortsetzen

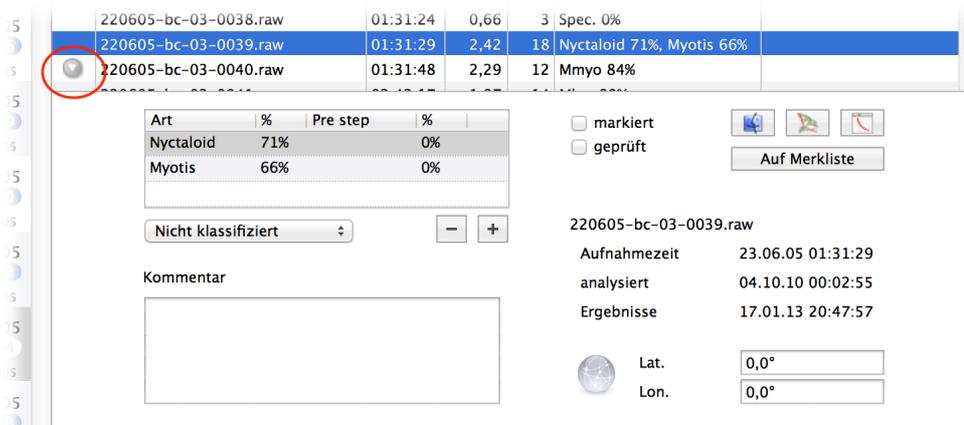
091012-TTESTS___-00010.raw	19:04:38	3,28	15	Pnat 61%
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8. Recordings

There are many methods in bcAdmin making management of your data easier. While most information is stored within the database for fast access, the raw recording files and all derived files are saved at the sessions filelocation. Some of the following functions need access to the files to work properly. Others can work on the database alone.

8.1. Recording details

The recording details allow to set details for each recording entry in the database. You can open the detail view by either double-clicking on a recording entry or by clicking the small arrow button in the lower left of the recording table.



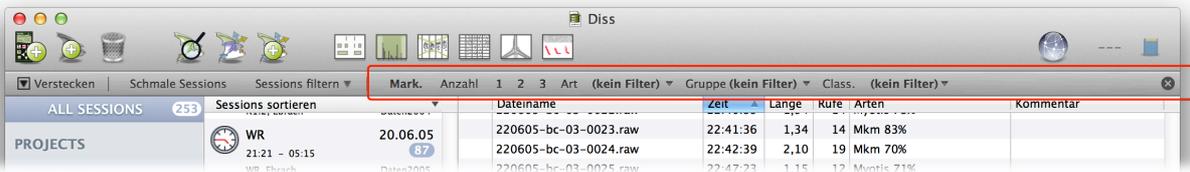
Each recording entry can be classified as normal sequence, social calls or feeding buzz. Apart from social calls of pipistrelle this will not be done automatically, but can only be checked manually. The comment field can be used for any kind of comment like for example your own guess regarding species.

Note: classification and comment can be set only for the whole recording entry, not for a single species entry.

Using the mark checkbox you can mark a recording to find it again easier. A checkmark for audited means, the recording result was manually controlled. There also exist buttons to open a file in Finder, with a sound tool like bcAnalyze or in the call preview of the file browser.

8.2. Filtering recordings

Simply by clicking the columns headers the whole table can be sorted using the column. In addition you have the possibility to filter using a couple of criteria listed above the recordings table:



Mark.: only marked (see recording details) recordings are shown

Count 1 / 2 / 3: only recordings with the according number of species are shown

Species: Only recordings with the selected species are shown

Group: Only recordings with the selected group entry are shown

Class: only recordings with the corresponding classification are shown

Note that the filter stays active even when you select an other session or dataset. Active filters are indicated by a red background of the filter bar. YOU can remove all filters using the **x** button on the right end of the filter bar.

8.3. Managing recordings

Copying and deleting original files

You can delete recording files displayed in bcAdmin directly via the according menu items in the **Recordings** menu.

Note: When deleting recordings bcAdmin's undo function does not restore the files from trash to their filelocation!

Managing database entries

Using **Sessions->Add recordings** or **Recordings -> Add recordings** new recording files can be added to bcAdmin. They will be added to the current selected session. You can't add recordings from different filelocations to one sessions, though.

9.Changing timestamps and durations

Changing timestamps

The timestamp for each recording is extracted from the file creation timestamp when the files are imported to bcAdmin. This timestamp may not be correct if the files were copied, sent by email or otherwise moved between different media. Thus it may be necessary to change the timestamp to the correct one. Various commands exist for this task. You can use **Recordings - Adjust recording** time to add or subtract a certain amount of hours,

minutes and seconds to the current timestamps. With **Recordings -> Adjust time from logfile** the logfile is read and timestamps are extracted from there for each recording. Furthermore a feature exists for SM2Bat and Avisoft recordings that store the recording timestamp in the filename. You can extract the timestamp from filename via **Recordings -> Set time from filename**. All you need to do is define the pattern date and time are stored.

Reset recording duration

If for some reason the recording durations are wrong, you can reset these using **Recordings -> Reset recording duration**.

9.1. Export as wave file

Selected recordings can be exported as wave files using **Recordings -> Save as Wave**. This may be useful if batcorder files have to be sent to someone not being able to open raw recordings. The exported files get the timestamp of the database entry.

9.2. Server upload

Selected recordings can be uploaded to an ecoObs server for examination by ecoObs or if requested using the menu **Recordings -> Server upload**. You will be asked to give some information before uploading the files as ZIP archive. If the file size exceeds 20MB a warning is displayed and you can alternatively select the file in Finder for other means of transport. We also recommend that you drop a line at runkel@ecoobs.de after upload is finished.

10. Data analysis

bcAdmin contains various tools to analyse your data for different goals. You are able to create meaningful activity summaries and graphs for your reports. Usually the following tools work on data of the selected sessions.

10.1. Species list

This feature gives a list of all species encountered at the selected sessions. Additionally sessions can be summarised based on project, location or state/flag. Based on averaged probabilities bcAdmin creates a probability for each species/group entry and indicates this with different symbols. Green checkmark ✓ means high probability, still with enough support is indicated with a light green checkmark ✓. A red exclamation mark ! shows entries that should be manually controlled. The basis is a weighted average over all species entries. Species with only a few entries may thus be more easily classified as of lower probability. The result can be saved as CSV or HTML file.

Taxon	ES1.2, Ebrach	K1.3, Ebrach	WH1.1, Ebrach	WH5.1, Ebrach
▼ Myotis	—	✓	!	✓
Malc	—	✓	—	!
Mdas	—	!	—	—
Mema	—	—	!	—
▼ Mkm	—	✓	—	✓
Mbart	—	✓	—	✓
Mnat	—	!	—	—
▼ Pipistrelloid	!	✓	—	✓
▼ Phoch	—	✓	—	—
Ppip	—	✓	—	—
▼ Ptief	—	✓	—	✓
Hsav	—	—	—	!
▼ Pmid	—	!	—	—
Pnat	—	!	—	—
Spec.	✓	✓	✓	✓

10.2. Activity report

The activity report is a powerful tool for comparing the data of various sessions or sample efforts. You create an activity report using **Analysis -> Activity report**. The report lists after its initial run for each selected session a column and a row per species/group entry. Sessions can be grouped using date, project or location entries. Data can be summarised

in form of count of sequences, recording durations in seconds as well as activity in one-minute classes. Some entries can be normalised based on sampling or night duration.

Taxon-Darstellung Zusammenfassung Aktivitätsindex

Diss – Aktivitäts-Bericht

Artniveau: Kürzel Zusammenfassen: gleicher Filecode Aktivität als: Aufnahmen

Taxon	ES2.1	K1.1	WH2.1	WH2.2	
Beschreibung	11.05.05 / 11.05.05	09.08.04 / 09.08.04	13.07.04 / 09.06.05	27.08.05 / 27.08.05	
Bbar		0	0	17	1
Enil		0	1	0	0
Mbart		2	1	2	1
Mbec		0	1	0	0
Mdas		2	1	1	1
Mdau		0	0	7	1
Mkm		4	5	20	1
Mmyo		0	0	0	1
Mnat		1	1	0	1
Myotis		1	3	8	6
Phoch		1	0	0	1
Pipistrelloid		4	5	3	0
Plecotus		0	0	1	0
Pnat		5	0	0	0
Ppip		44	41	6	0
Ppyg		0	0	5	0
Snec.		3	5	11	6

Kommentar für HTML-Ausgabe

Schliessen CSV speichern HTML Generieren Grafik zeigen

The following activity indices are implemented:

- ❖ Seconds: The average activity of each species per second is calculated
- ❖ Seconds / hours night: Seconds normalised on night duration
- ❖ Seconds / hours sampling: Seconds normalised on sampling duration
- ❖ Sequences: The average number of sequences
- ❖ Sequences / hours night: Sequences normalised on night duration
- ❖ Sequences / hours sampling: Sequences normalised on sampling duration
- ❖ 5sec classes (Poland): activity is pooled in 5 sec. intervals according to polish guidelines
- ❖ 1-minute classes: for each minute of sampling time with activity the minute count is increased. Thus, all sequences of the same species recorded within a minute count as one. Sequences that have a timestamp outside the sampling time are ignored. Thus check that session settings are correct before using this function.

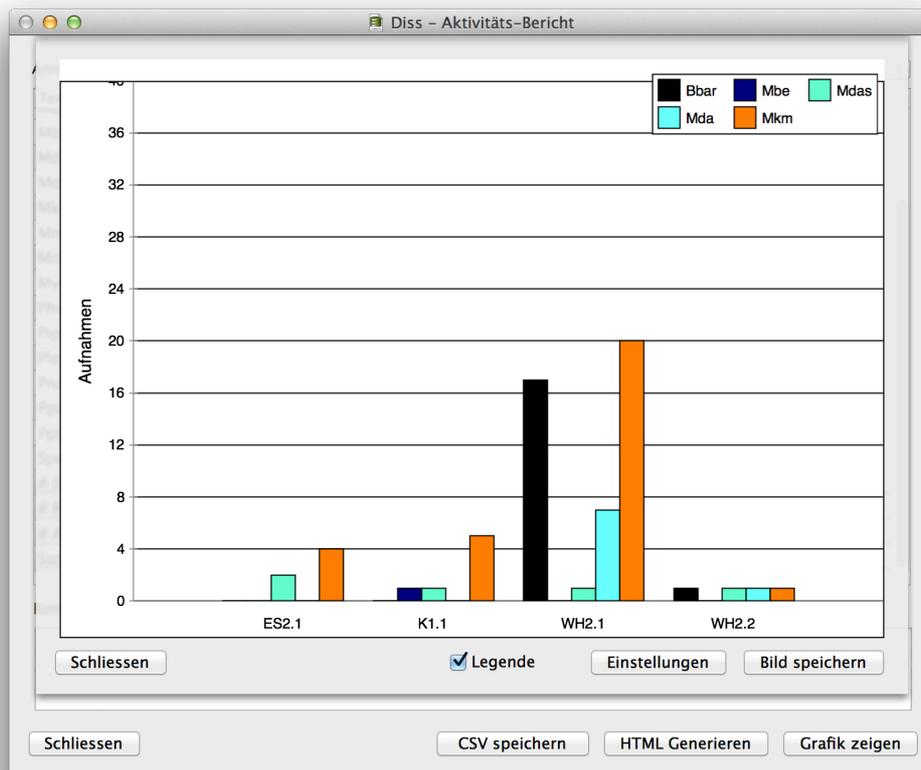
For some of the above calculations suntimes and sampling times from the session entries are used. Make sure these are set correctly, otherwise you may receive wrong results.

Export to CSV or HTML

The displayed results can be exported to a CSV file for import to graphing apps or other databases. The standard setting is that the table will get transposed for export, but you can switch that off in the app preferences. HTML export works the same and creates a HTML preview for printing or saving.

Graphical display

A new function to bcAdmin 3 is the graphical display of results of the activity report. After selecting the report options a simple bar chart can be opened using the button **Show graph**. When opened the first time it displays the sum of seconds of each column in the report. Clicking on **settings** opens a dialog that gives options like species selection. That way you can select certain species for display in the graph.



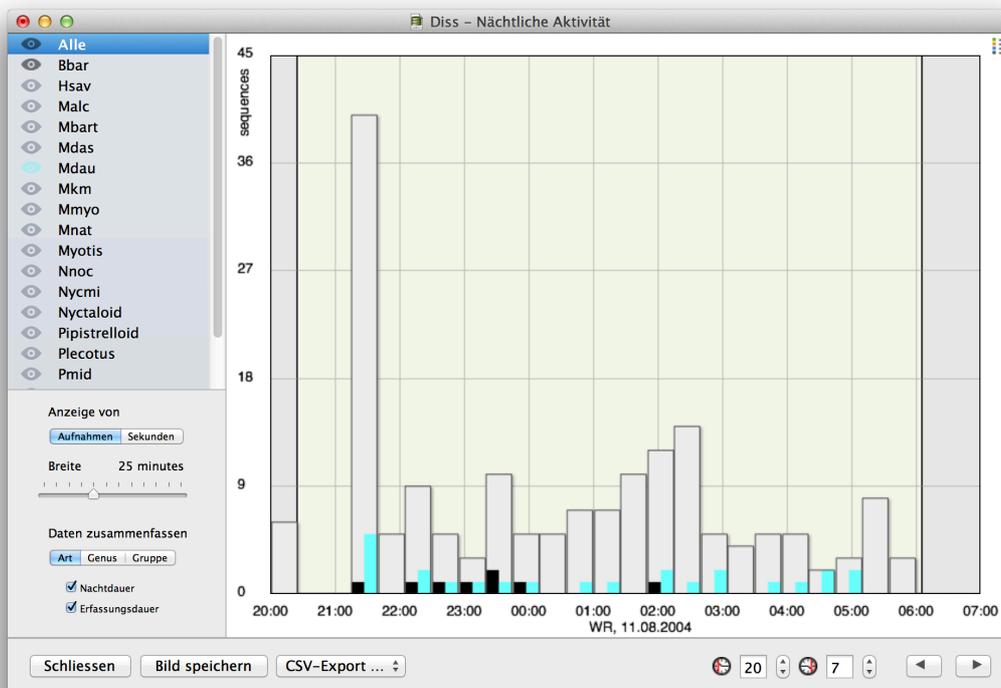
The species colors are taken from the values set in the taxon-editor. If you want or need other colors, change them there for the whole database.

10.3. Species tree

The species tree displays the distribution of species identification for the selected sessions. It resembles the steps batIdent went through to find species for the recordings. You can opt to display number, seconds or minutes of activity per tree element. The numbers are also coded using either small bars or pie charts, you can chose between those two displays. In addition the average probability for each tree element can be plotted. The graph works well for showing diversity as well as for finding identification errors by looking at the numbers shared between similar calling species or groups.

10.4. Nocturnal activity

For various reasons it may be helpful to examine activity at a location throughout one night. Emerging patterns may indicate roosts, or other bat relevant structures. For single as well as multiple sessions bcAdmin offers the display of nocturnal activity. It can be accessed via **Analysis -> Nocturnal activity** after the relevant sessions were selected.

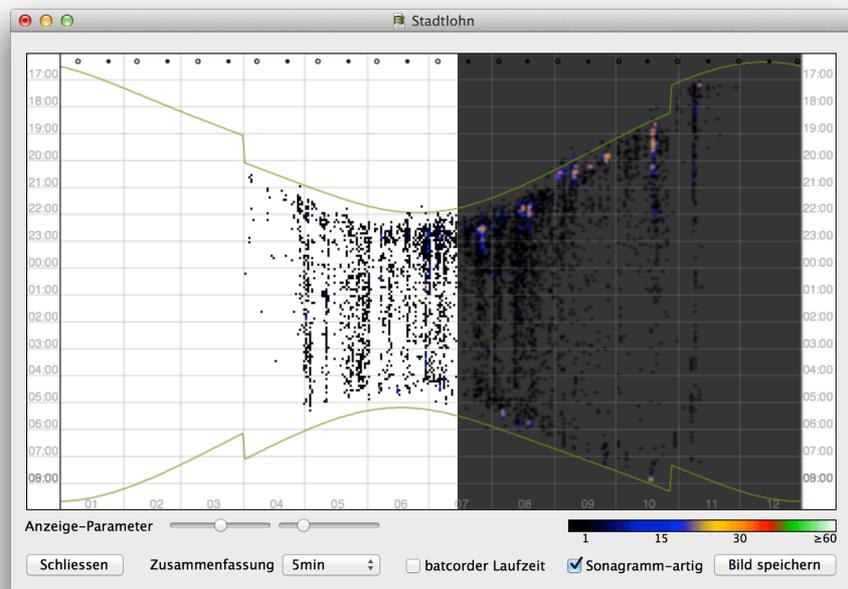


Activity is displayed as bars in a histogram like way. The bats can either represent number of sequences or seconds of activity per bin. You can adjust the bin width from 5 to 60 minutes. The background can be filled to indicate night or sampling duration. To allow better comparisons of different nights, you can also set the displayed time frame. Single species can be plotted as sub-bars by clicking the eye symbol next to their name in the left column. Finally the display of either species, genera or groups can be toggled. For export a legend can be toggled using the small legend icon in the upper right (only visible if species are

coloured). A right click on the graph shows a context menu with options to set a maximum y-axis value as well as graph subscription.

10.5. Yearly activity

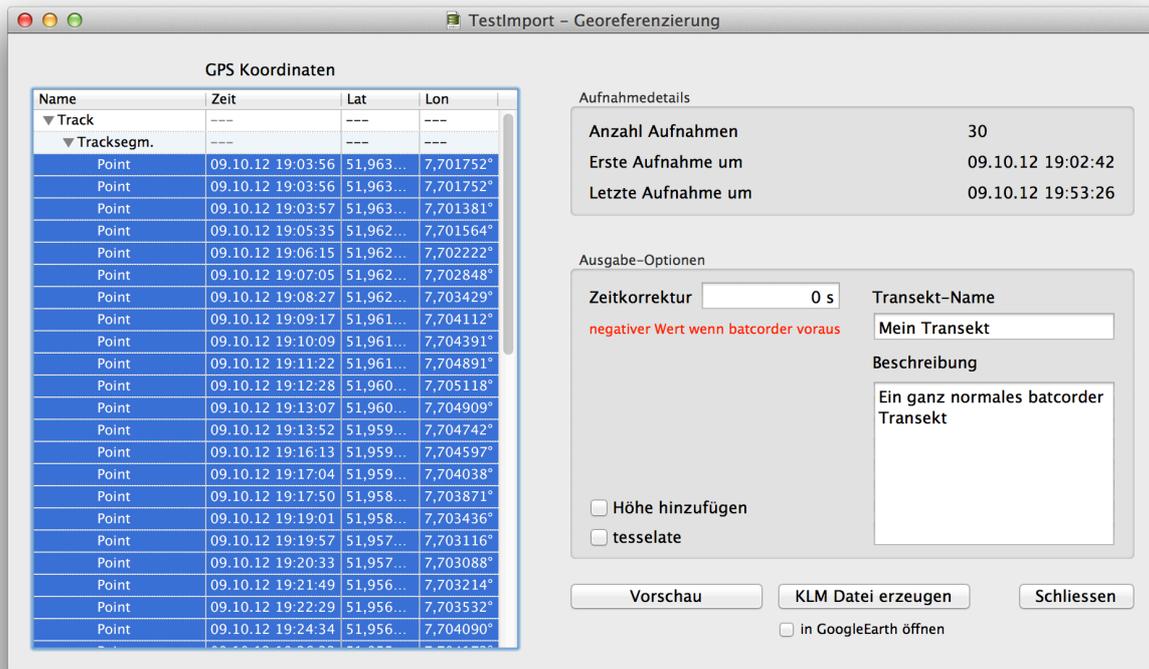
If you are doing long-term monitoring your interest often lies in the activity pattern throughout the year. This feature allows you to take a closer look at bat activity distribution split into daily and nightly patterns within one graph. It works for the selected recordings, thus you can easily display graphs for single species or all recordings. It is not meant as a graph to read accurate maxima and minima, but to give an overall impression of activity patterns. To draw the graph select **Analysis -> Yearly activity** after you have selected sessions and recordings. For better understanding of patterns the batcorder runtimes can be displayed in the background. They are taken from the session settings. Based on the coordinates sunset and sunrise are drawn as lines. If no location with coordinates was given to the sessions, a standard mid Germany location is assumed.



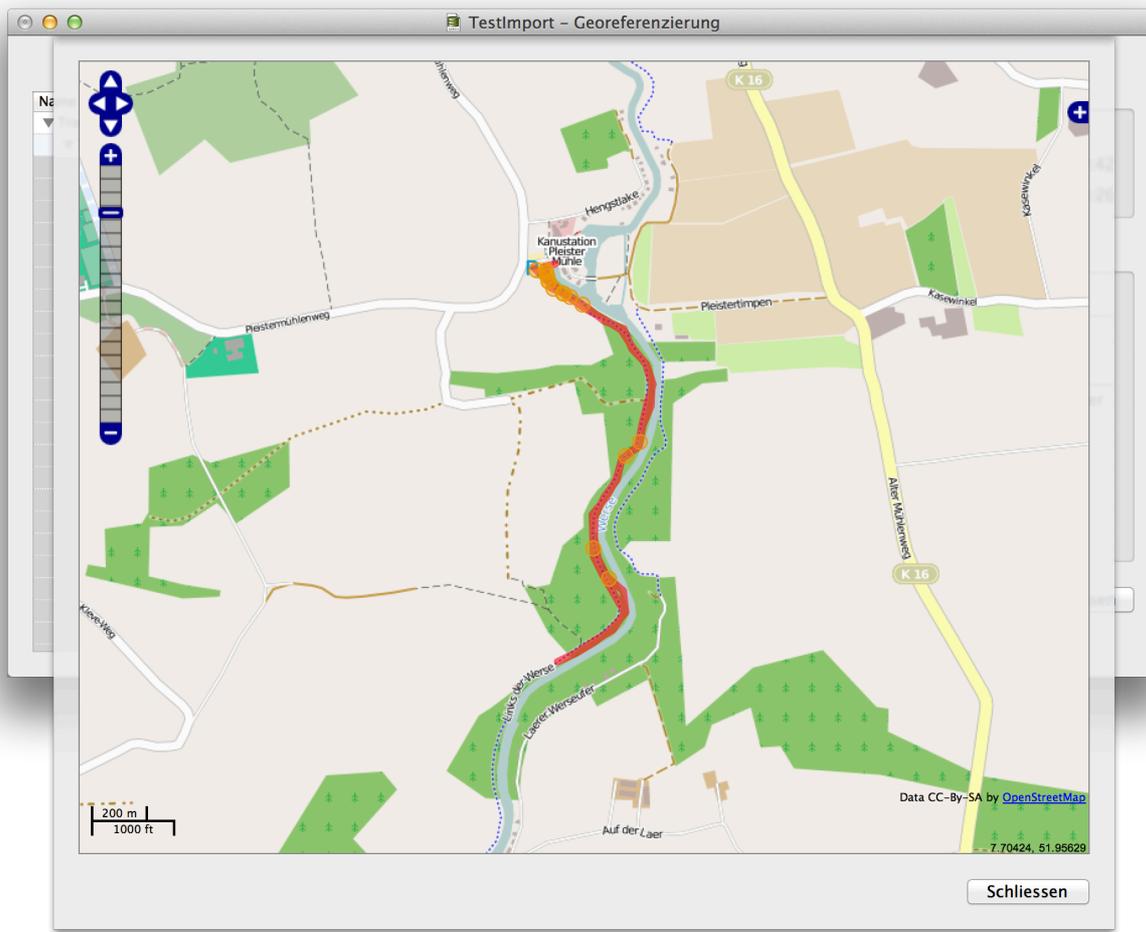
The sliders below the graph allow to change the color fill similar to a sonagram. To resemble a sonagram even more, you can activate a sonagram-like display as well. Export to an image file for adding the graph to reports is possible as well.

10.6. Georeferencing

This feature allows to geo reference recordings using a GPX file created by a GPS device (tracklog). Based on recording timestamps the coordinates for each recording are interpolated from the tracklog.



As expected the selected recordings are used when starting the function. Before proceeding you have to locate the GPX file. Next select the corresponding waypoints or tracks in the left table. Only coordinates with timestamp can be selected. The results are saved for each recording when KML export is chosen. The preview works only if your Mac is online.



10.7. Environmental correlation

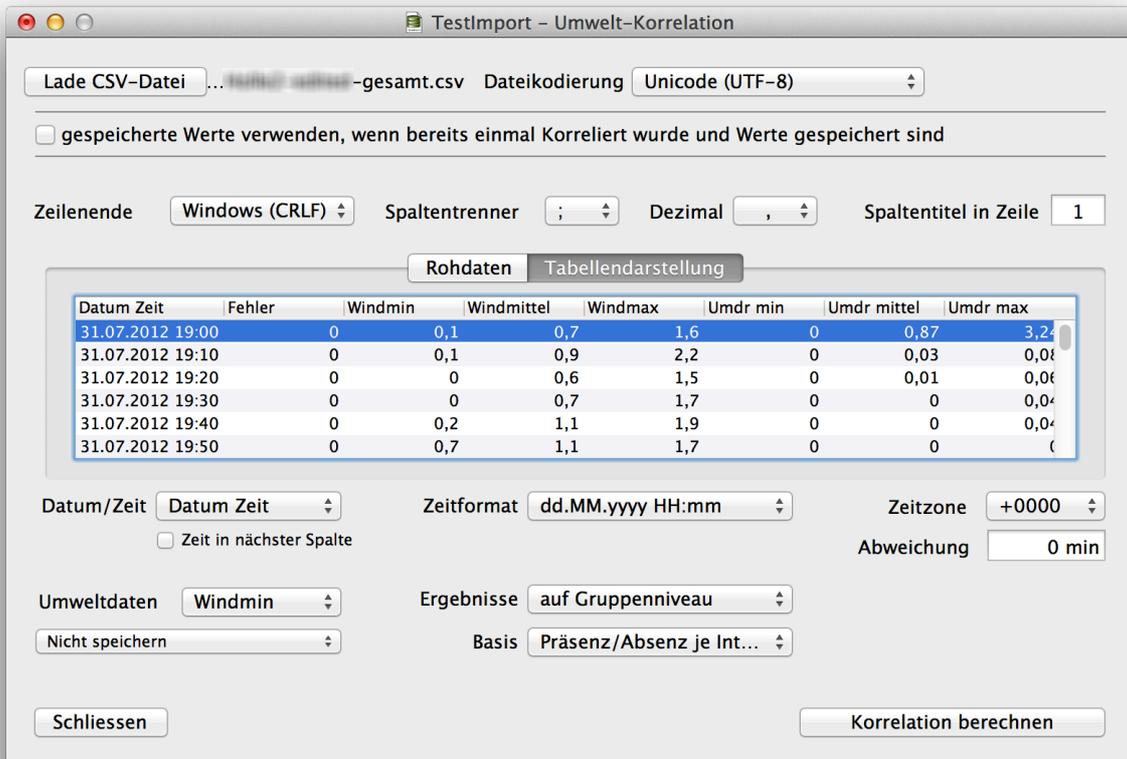
One of the most complex features implemented in bcAdmin is the correlation of activity data with environmental parameters, mainly wind speed. This tool was developed to understand activity in relation to wind speed better and support the bat-friendly running of wind turbines.

Input data

The calculations are based on the selected recordings, thus, first select the recordings you want to run a correlation for. That way you can select recordings of all bats or of certain species. If you select recordings without species entry, these will be correlated as well. Using the recording filter capabilities helps to select wanted recordings quickly.

Next you need a CSV file containing the environmental data or have data stored per recording (for example from an earlier correlation or temperatures from logfile import). This data currently is expected to be measured in 10 minute intervals. The file needs one column containing the measurement timestamp (end of measurement period; date and time) and one column containing the environmental data. bcAdmin will be very flexible regarding

various CSV formats. We only recommend to use descriptive column titles in the CSV file. The CSV file may contain other, unused columns as well.



It is important to check the CSV file for errors before using it. Some errors are covered by bcAdmin for, others won't be easily recognised automatically. Also make sure you have information regarding the timezone the timestamps in the CSV file are registered in. Also adjust for any time lapse between batcorder and data collector to get an optimal correlation. Note, to work properly the recordings as well as the CSV data has to be sorted from oldest to newest.

Timestamp selection

After reading the CSV file you have to check various settings regarding the CSV format. Most should be recognised automatically. One that usually needs a change is the timestamp format. The plugin covers various timestamp patterns and you have to choose the correct one, otherwise the timestamps can not be interpreted. You also may have to remove leading lines by telling the app at which line data starts. The previews (raw data and tabular will be useful for this). If your timestamp pattern is missing, please drop us a line and we will add it with the next update. If the batcorder was ahead of the datalogger clock, you have to set a negative value for batcorder offset.

Data selection

Select the column that you want to calculate a correlation, either wind speed or temperature. Other data can be chosen, but the app may not be optimised for it. You can store the values per recording using the dropdown menu.

Correlation parameters

Last step before running the correlation is to select if results are given per species or per group level. Additionally select if a binary count (based on 10 minutes intervals) or the actual count of recordings is used for the correlation.

Correlation without CSV file

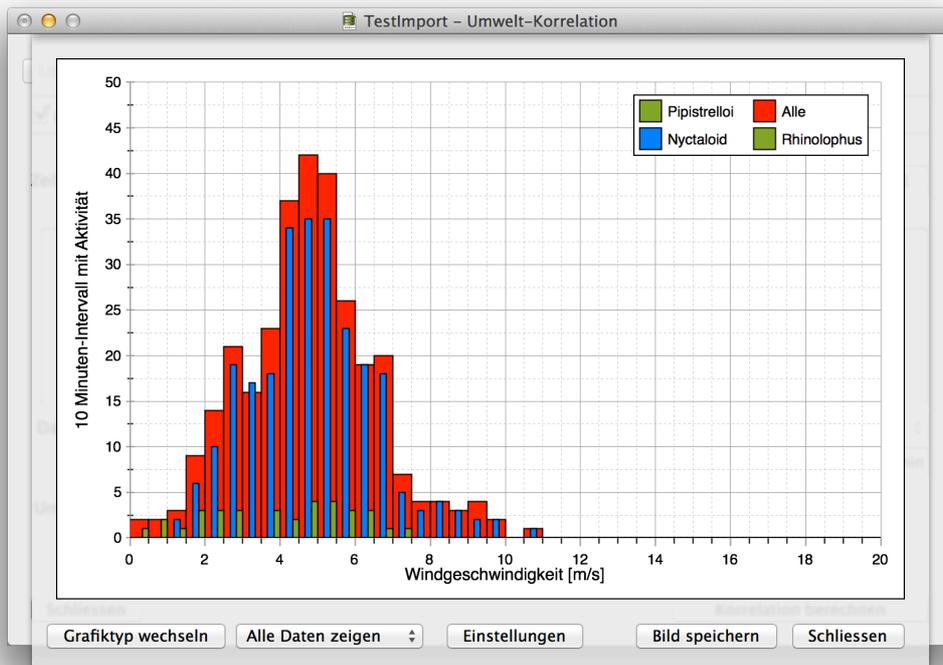
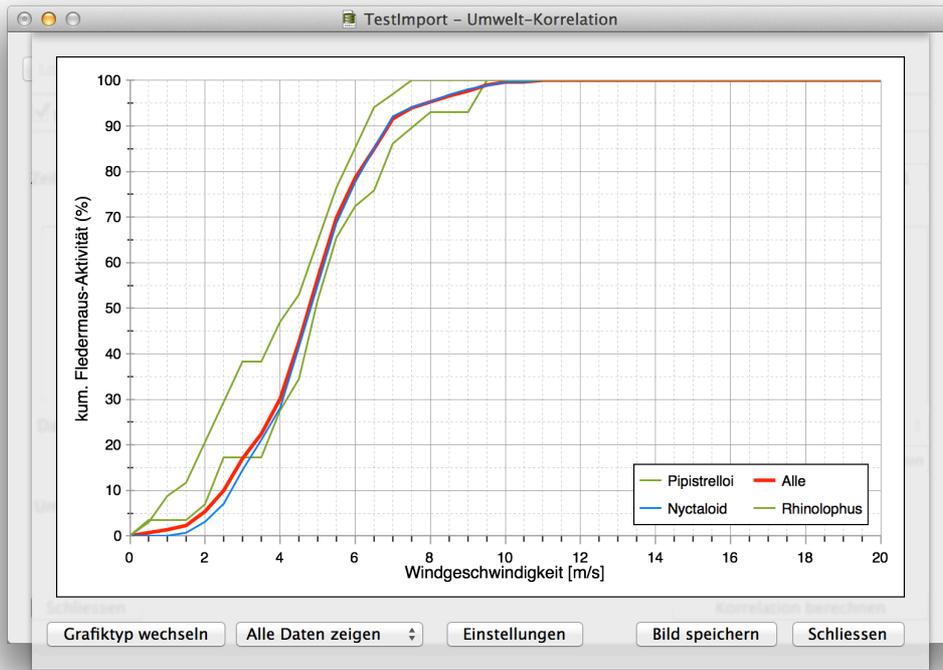
If you have already run a correlation before and have stored the environmental data with the recordings, a new correlation can be run using the stored values. This allows to create the graphs without choosing CSV file and columns.

Correlation background

After extracting the data range of the environmental parameter it is distributed evenly over 60 bins (minimum to maximum). When correlating wind speed usually the range is set to 0 m/s to 30 m/s resulting in 0.5 m/s bin widths. The current bin width can be seen in the data stored in the clipboard after a successful correlation or from the filter button below the graph. We plan to allow a variable bin width that can be chosen by the user in a future update.

Graphs

The correlation results are shown as line or bar plot, raw data is saved to clipboard in addition and can be imported into other applications that way. The default line graph shows cumulated bat activity as percentage above the selected environmental parameter. For wind speeds 0.5 m/s classes are used, for temperatures 0,5° respectively. By either using the plots context menu (right-click) or the settings button various display parameters can be changed. When doing a left-click in the graph the area between the y-axis and the clicked point is filled with a different colour. That way you can for example click on the 95% of bat activity point and fill the part left of it indicating wind speeds that will be dangerous for bats. Finally you can switch between cumulative line display and a bar chart.



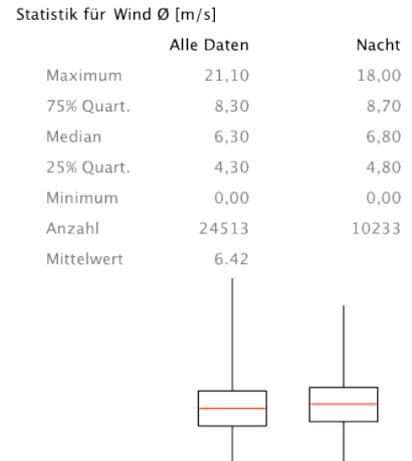
CSV analysis

With version 3.2.4 bcAdmin offers some simple tools for analysing a CSV file containing environmental data for correlations. This allows to check for some errors in the data as well as to plot simple graphs to get a better understanding of the data. After selecting the columns containing timestamp, format and data, the following analysis are available through **CSV analysis**.

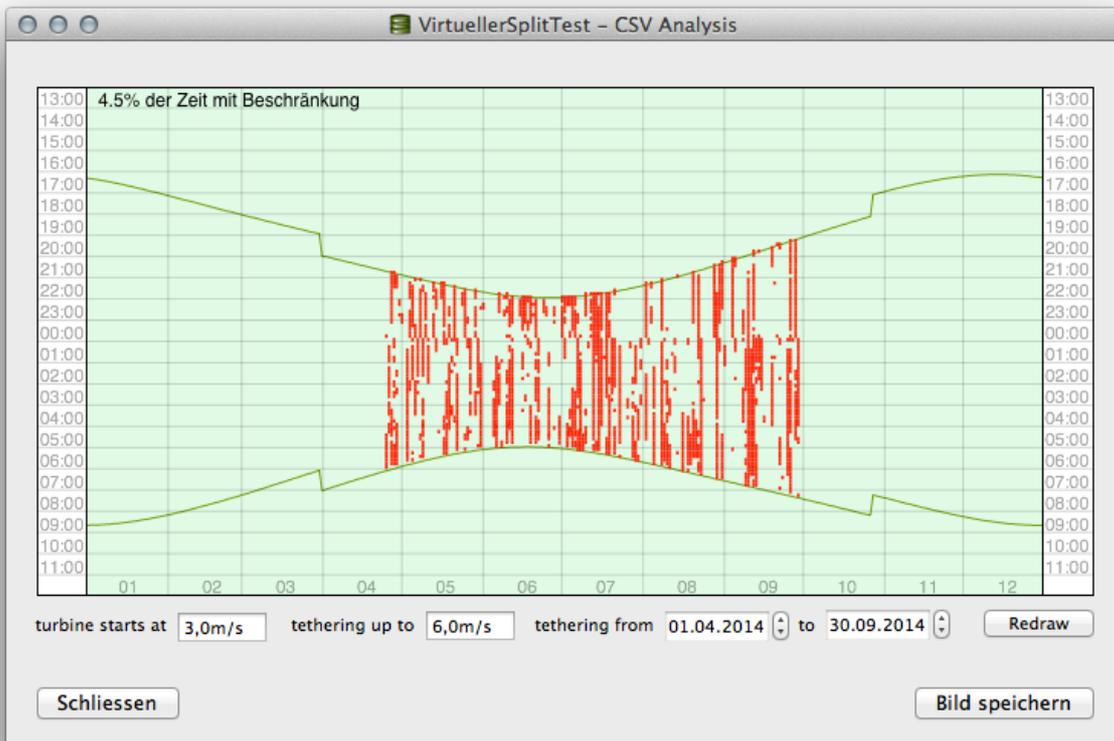
The **Timeline check** gives a list of gaps in the timeline data. Currently all gaps differing from 10 minute intervals are shown. If the gap duration is above 60 minutes, it is plotted in red.

The analysis run with **Data check** will give some statistical properties of the environmental data calculated for the full data set as well as for data recorded at night time. To get the sunset and sunrise times either the selected sessions location entry is used or, if not available, a location in the middle of Germany is taken.

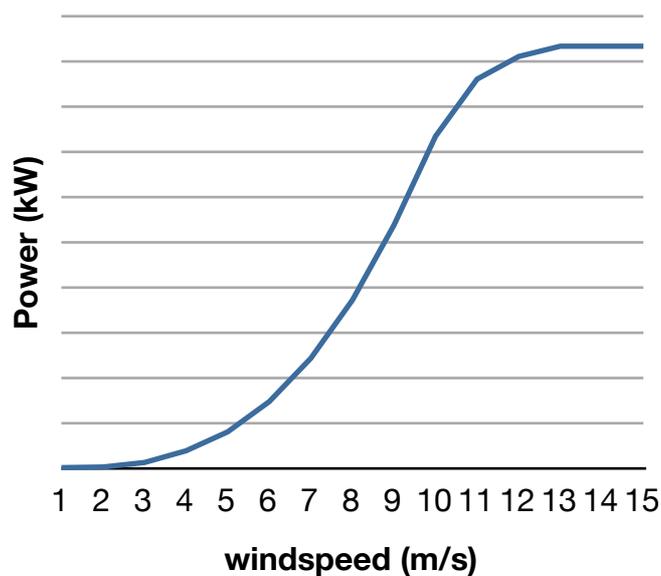
The results can be saved to an image file as shown to the right.



After doing a correlation usually a wind speed or other parameter is selected which acts as threshold value for curtailment of a wind turbine. The **Curtailment** function allows you to plot a graph showing in red 10 minute intervals that will fall within the curtailment parameter. You can in additions elect the windspeed at which the turbine starts to produce power if no curtailment is chosen (usually 3 to 4 m/s). In addition a time frame is selectable to exclude time ranges where no curtailment algorithm is active. In the top left corner of the plot the percentage of 10 minute intervals with curtailment is given.



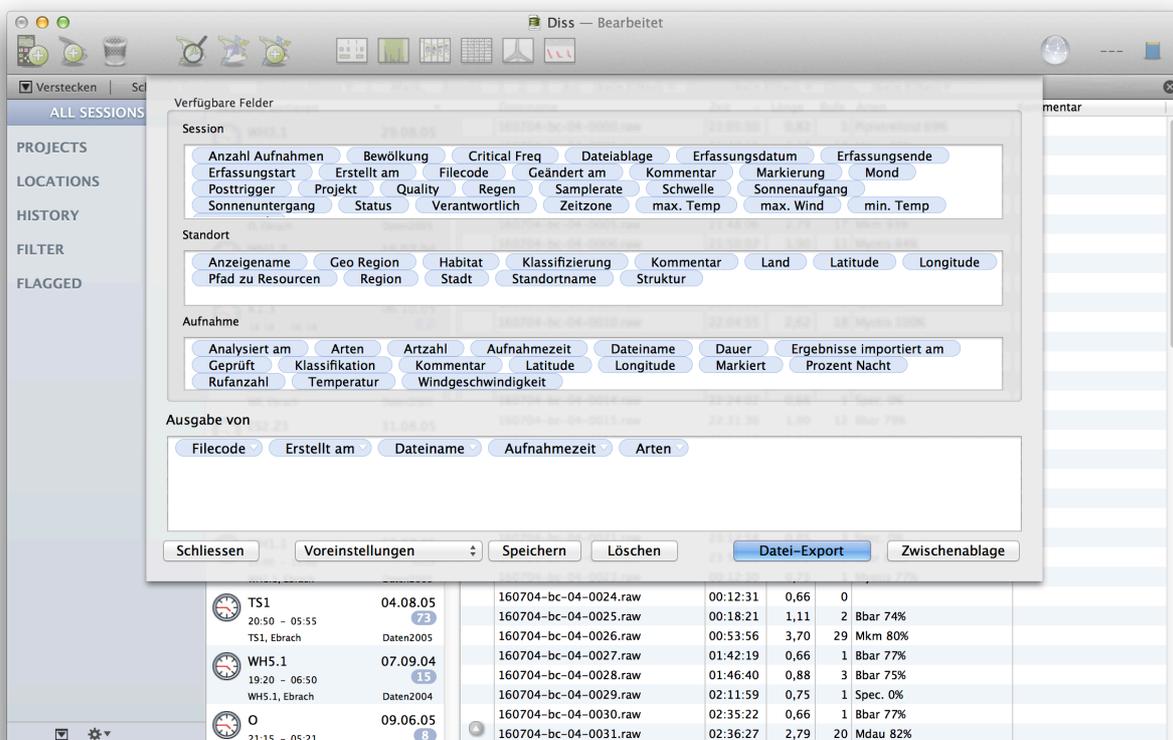
This does not resemble the actual loss of the wind turbine owner directly, but only gives an indication of how often curtailment can be expected based on the supplied wind data. Modern wind turbines are optimized on higher wind speeds and thus produce over-proportional more power at higher wind speeds as shown in the graph below.



11. Data export

11.1. Raw data export to CSV

By using **File -> Export to CSV** you can export selected recordings and sessions to CSV in a very flexible way. The export dialog contains all fields that can be exported in the upper three groups of items. They are separated by session, location and recording. The fourth, lowest field acts as container for the actual export. Drag items from the above fields to the fourth to construct the export. You can save export selection and reload previously saved export configurations. Stored export configurations can also be set as default for copy and paste from the session and recordings table. Thus, you can create a CSV string for the clipboard more quickly.



If you have selected **species** from the list of recording fields, you can choose if you want a new line for each species (if more than one is stored for a recording) or if all species should be within one line. The switch for this can be found in the application preferences. This is a new feature of bcAdmin 3, in bcAdmin2 always a single line was written for each recording.

Note: Details regarding the CSV format can be all set in the application preferences via the Export display. There you can set column or field separator as well as line-ending.

11.2. Locations export

Locations can be exported to CSV or KML files for further use in GIS applications. Either use the CSV export described above or the KML export function implemented in the locations editor.

Export recording locations

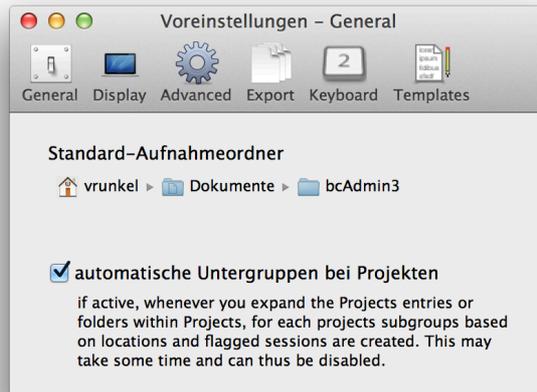
If recordings are georeferenced, their locations can be exported to KML. Select the recordings you want to export and export them via **Recordings->Geo-Referencing-YKML Export**.

12. Preferences

The behaviour of bcAdmin can be fine-tuned using various preferences settings. They influence the call finder, CSV export or colours used within the application.

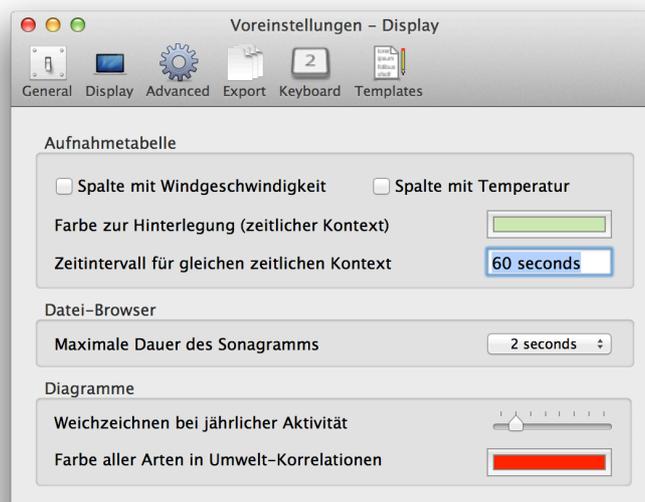
12.1. General

Choose the default folder for recordings and if project subgroups should be created automatically.



12.2. Display

Choose if the recordings table shows a column for windspeed and temperature (values may not be available for recordings prior to running an environmental correlation). Activate colourisation of recordings within a temporal context.



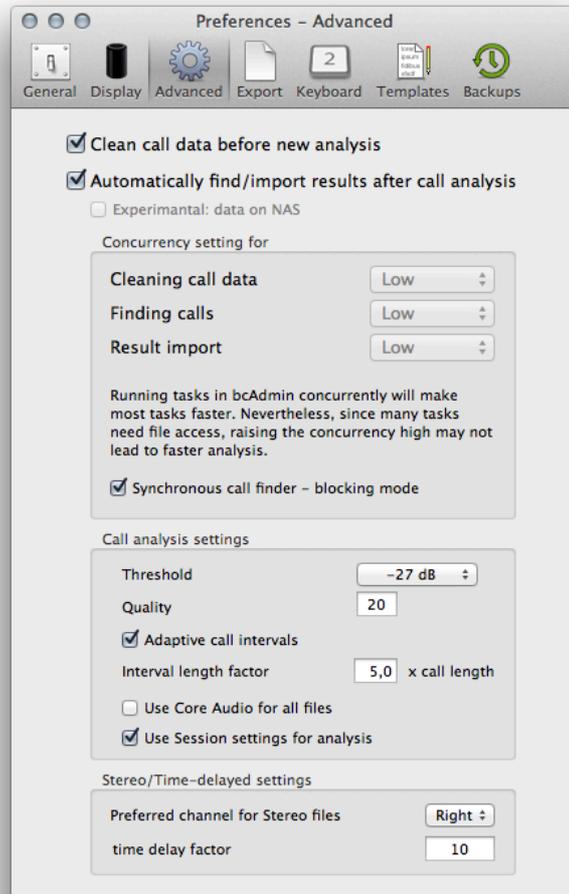
You can set the time in seconds for the sonagram preview of the file browser. You also set the amount of blur for the yearly activity diagram (if set to sonagram-like mode). Another setting for a diagram is the colour for „All specie“ in the environmental correlation graphs.

12.3. Advanced

This dialog allows to set parameters of the call finder and other parameters regarding the analysis process. Choose if for all recordings existing data is deleted prior to a call analysis. Also, activate automatic species identification and import if you want bcAdmin to automatically start batIdent and results import in the background. batIdent needs to be installed and available as service for this feature.

If you want to gain speed, you may change the parallelisation options. We recommend to keep the lowest values, if problems occur. That should already be fast enough. If you have an unstable or very slow call finder, you may want to switch to serial call finding mode that also blocks all other parts of bcAdmin to avoid interruptions. By checking **synchronous call finder** this mode is activated. Note in this mode currently the species results are not imported automatically!

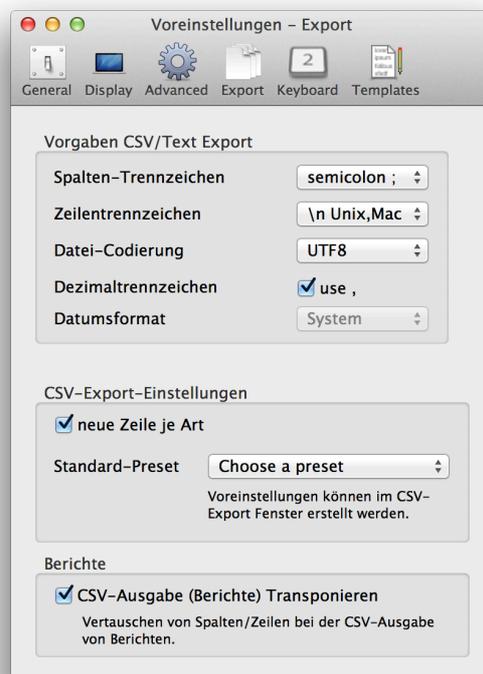
Another feature for recordings with a lot of echoes or from long-term monitoring in the open space is the **adaptive call interval**. You set a factor and based on the call duration multiplied with that factor a part of the recording after the call is excluded from the call finder. That way echoes are not misinterpreted as calls so easily and in general species results should be improved. Good factors are 3.0 to 7.0.



12.4. Export

Parameters for export are used application wide and can be set here. That primarily influences the creation of CSV files, thus you can set column and decimal separators and such. If you want activity and species reports not to be transformed when exported to CSV,

you can choose this here as well. Also, if presets for CSV export are stored, you can choose one here which will be used for copy and paste to other applications.



12.5. Key bindings

The file browser as well as the recording table allow the quick adding of species to the selected recording. The key bindings for this feature can be set here application wide. This allows you to set the species entry of a recording to the one you bound to the according key. If you use this feature, but want to add a species, just press the **alt** key when using the quick key.

12.6. Templates

Choose the default labels for the various flags. These are used then when a new document is created. If you created your own colour sets for species you may want to automatically use it for newly created documents. To do this, just choose a PLIUST file created with the Taxon-Editor.

13. Miscellaneous

13.1. Licensing

The application runs for ca. 30 days without the need of a license key. If you want to use it after that period you will need to buy a license. The license will be registered for your name and email address. Both will be regularly checked by bcAdmin via connecting to our license server. Thus you need to connect your Mac to the internet at least once a week (a mechanism exists to prolong this period if you are doing field work for example).

Multiple licenses or multiple computers

We added due to many requests a new feature in bcAdmin 3.0: you now can deactivate the license for one computer and activate on another, thus you can switch between multiple Macs. Running bcAdmin is possible only on one simultaneously. If you need to run it on multiple Macs add your wish, you can also buy additional licenses. The new license server can be set to allow multiple connections.



13.2. Updates

There will be free updates to bcAdmin on an irregular basis. The application does connect to our server and download these automatically. If you want to check for updates manually, there exists a menu command in the bcAdmin menu.

13.3. batcorder Firmware-Update

bcAdmin also will announce firmware updates for the batcorder. Again, an internet connection is necessary for this feature.

14. Tips & Tricks

14.1. TimeMachine Backups

Mac OS X comes with a powerful backup tool, directly implemented in the core OS: Time Machine. It backs up your hard disc hourly and allows you to travel to various points back in time if you need to restore a certain version of a document. All you need is an external disk and allow Mac OS to use it as TimeMachine volume.

14.2. Folder structure for recordings

We can recommend the following structure of folders for recordings to simplify backup and for moving old projects to archive disks without much hassle for bcAdmin.

```
Recordings
  ProjectA
    SESSIONA
  ProjectB
    SESSIONX
      100505
      100515
  ProjectC
    SESSIONA
      100601
      1007005
    SESSIONB
      100520
      100521
    SESSIONC
```

If you use the SDHC-import feature of bcAdmin, the folders for each night (for example 100505 = May 5th 2010) are created automatically.

This folder structure allows copying of whole projects to an external disk and allow a simple filelocation change for all sessions belonging to this project.

14.3. Working with large numbers of recordings

Since the introduction of the batcorder-system its usage has changed. While in the beginning single nights were recorded, today the log-term monitoring extensions are used heavily. Thus, large numbers of recordings collected over a long time period have to be handled. This has implications on the way species identification can be audited. It is hardly

possible to look through each recording and another scheme for auditing has to be used. The following process can be seen as a prototype for auditing these quantities of data and can be adapted to your needs. Always keep in mind, that if you work with larger numbers to not look at absolute sequence counts of species. If you record 10000 N. leisleri and batIdent has an error rate of 10% for misclassification of N. leisleri to V. murinus, you will end with around 1000 recordings classified as V. murinus. If you recorded 10, it will be 1. Thus, keep the percentages in your mind!

First rough auditing

In a first step, directly after importing batIdent results we recommend to filter Pipistrelloid social calls and look at these. Bad quality N. noctula calls tend to get classified as Pipistrelloid social calls and this can be quickly evaluated and changed via the batch replace species command for example. Next look at the species tree and get an overview of identified species. Then automatically replace species not occurring in your area.

Analyse species groups

After the first cleanse of identification errors certain species groups, relevant for your project should be investigated. We recommend to browse through single nights using the file browser and activate the temporal context colourisation in the recording table. That way you'll be able to quickly fix results for groups of recordings belonging to the same bat. Make heavy use of the quick keys for setting correct species results. Don't look at every single recording than but rely on the fact that a single bat will produce a couple of recordings if it is hunting in the vicinity. After some training you should be able to do that task fairly quickly without many errors. Always allow some checking by randomly selecting. Even after this second step some misinterpreted results will be left. They may be ignored.