

The screenshot shows the bcAdmin application window titled 'Suedumgebung.bca'. It features a menu bar with 'Add', 'Remove', 'Edit', 'Add Recordings', 'Locations', and 'Reports'. Below the menu is a filter section with 'No Filter' and 'Automatisch' options. The main area contains two tables:

Session ID	Date	Reason	Location	Start	End
RWXXXXXXX	02 Mai 2008	Transekt	Buckenhof, Transekt	20:26	21:53
RWXXXXXXX	09 Mai 2008	Transekt	Buckenhof, Transekt	20:52	23:43
RWVXXXXXX	09 Mai 2008	Transekt	Buckenhof, Transekt	20:47	23:53
SCHW1AXXXX	10 Mai 2008	Automatisch	Uttenreuth, SCHW1	21:20	07:00
E1AXXXXXXX	10 Mai 2008	Automatisch	Buckenhof, E1	21:10	07:00
C2AXXXXXXX	11 Mai 2008	Automatisch	Buckenhof, C2	21:00	07:00
B1AXXXXXXX	11 Mai 2008	Automatisch	Buckenhof, B1	21:00	07:00
N2AXXXXXXX	13 Mai 2008	Automatisch	Weiber, N2	20:56	07:00
WE1AXXXXX	13 Mai 2008	Automatisch	Weiber, Schwabach	20:56	07:00
RWXXXXXXX	19 Mai 2008	Transekt	Buckenhof, Transekt	21:06	23:20
L1AXXXXXXX	26 Mai 2008	Automatisch	Uttenreuth, L1	20:55	07:00
L2AXXXXXXX	26 Mai 2008	Automatisch	Uttenreuth, L2	20:52	07:00
RWXXXXXXX	26 Mai 2008	Transekt	Buckenhof, Transekt	21:00	23:59
UM260508	26 Mai 2008	Transsekte	Buckenhof, Q3	21:34	21:39
UM260508	26 Mai 2008	Transsekte	Buckenhof, P1	21:11	21:15
UM260508	26 Mai 2008	Transsekte	Buckenhof, M1	21:16	21:24
UM260508	26 Mai 2008	Transsekte	Buckenhof, P3	21:48	21:54

filename	time	length	Calls	Species 1	Prob.	Species 2	Prob.	Comment
260508-K1XXXXXXX-0024.raw	23:52:46	0,68s	4	Myotis	80%			
260508-K1XXXXXXX-0025.raw	23:52:46	0,46s	3	Myotis	85%			
260508-K1XXXXXXX-0026.raw	23:52:48	0,95s	6	Mkm	84%			
260508-K1XXXXXXX-0027.raw	23:53:08	0,76s	2	Mkm	75%			
260508-K1XXXXXXX-0028.raw	23:53:16	0,80s	3	Myotis	88%			
260508-L1XXXXXXX-0023.raw	23:12:32	2,35s	19	Nyctaloid				War nur Spec.
260508-N1XXXXXXX-0001.raw	21:44:30	1,01s	6	Ppip	97%			
260508-P3XXXXXXX-0002.raw	21:52:26	0,81s	4	Ppip	92%			
260508-P4XXXXXXX-0003.raw	21:57:16	0,58s	2	Ppip	84%			
260508-P4XXXXXXX-0004.raw	22:00:58	1,49s	11	Ppip	91%			
260508-P4XXXXXXX-0005.raw	22:01:00	0,62s	3	Pipistrelloid	88%			
260508-P4XXXXXXX-0006.raw	22:01:00	1,00s	3	Pipistrelloid	88%			
260508-Q4XXXXXXX-0020.raw	22:57:02	0,82s	3	Ppip	88%			
260508-Q4XXXXXXX-0021.raw	22:57:18	0,46s	2	Ppip				Balzfufe inklusive
260508-Q4XXXXXXX-0022.raw	22:58:14	0,66s	2	Ppip	83%			
260508-WXXXXXXX-0007.raw	22:08:36	0,85s	7	Mnat	69%			
260508-WXXXXXXX-0008.raw	22:13:44	1,69s	13	Myotis	62%			

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Legal

The application bcAdmin was created according to best knowledge and thoroughly tested. Nevertheless its failure free use can not be guaranteed under no circumstance. If you encounter errors, we ask you to report these to us so we can try to improve the application for you.

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In no event can we be held liable for any direct, indirect, incidental or any consequential damages risen by the use of the software.

Prerequisites

bcAdmin was developed for Apple Computers running OS 10.4 or newer. It runs on PPC as well as Intel Macs and expects at least 512 MB of memory. Hard disk size should be big enough to hold the recordings from the batcorder.

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1. Quickstart

The following steps show how to load recordings from SDHC card and how to analyze them in bcAdmin. This chapter's intention is to give you a quick headstart, it does not go into detail on how to effectively use bcAdmin. We recommend you read the further chapters as well.

1.1. Loading and analyzing recordings

1. Remove the SDHC card from the batcorder and insert it into the card reader connected to your Mac. Copy all recordings into a folder on your Mac's hard disk. Create for example a folder labeled „bcAdminTest“ on your desktop and copy the files via the Finder there.
2. Start bcAdmin - the tables will be empty upon first start.
3. Create a new **Session** by clicking the menu item **Session** -> **Add Session** (or the + button above the upper table). Edit the session fields and make sure that ID (= filecode of the batcorder) as well as date are set (required values!). After editing the fields close the sheet. You now have the first entry in the upper session table.
4. Make sure the newly created session entry is selected in the table. Then click the + button above the lower table to add recordings to this session. In the appearing dialog you'll have to navigate to the location on your hard disc that you copied the files to in step 1. Select the first raw file and press **command + A** (⌘+A) to select all other recordings. Clicking on **Open** adds the selected recordings to the lower table and connects them to the currently selected session.
5. For each imported recording basic information are displayed in the lower table (recording time, duration). Click the first recording to select it and then press **command + A** (⌘+A) to select all other recording entries from the table and choose **Recordings** -> **Analyse** from the menu bar to start analysis of all selected recordings.
6. When this process is finished, bcAdmin has created a csv and a data

file for each recording. These are stored together with the raw file on disk. In bcDiscriminator you can choose the csv files to create identification results (in .res files).

7. After running bcDiscriminator on these files you can switch back to bcAdmin and import these results. Make sure all recordings are still selected before you choose from the menu bar **Recording** -> **Import results**.

1.2. How to go on ...

You have loaded, analyzed and identified species for your first set of bat-corder recordings. The steps necessary in this process will be important for every other time you choose to add sessions, files or results. bcAdmin is based on sessions, thus, it is highly important to get used to store recordings of a single night and batcorder with their own session.

The following chapters deals with more detailed instructions of bcAdmin features. You will for example learn how to import files even quicker than with the method mentioned above.

2. Overview of bcAdmin

2.1. Quick overview over bcAdmin features

The management of recordings on a per night and location basis is important for the later analysis and interpretation of the available data set.

bcAdmin allows the simple to use management of recordings. All information apart from the actual recording data is saved in a database with a high performance. Sound files remain as raw files on the hard disk. Measurement and result files also remain on the disk to allow a simple way of backing up these data sets.

Thus, bcAdmin acts as a central container for all recording relevant information and from there exports for reports or statistical analysis are possible. A detailed description of the database can be found at the end of this manual.

2.2. Application elements

The main window is split in three main parts, with the session and recordings table occupying the main space on the right side of the window. The upper half hold all session entries, the lower all recordings of the selected session. If multiple sessions are selected, the recordings table stays empty. Both tables can be sorted and filtered.

The narrow left bar holds filter. These can be edited via the small symbol button in the lower left.

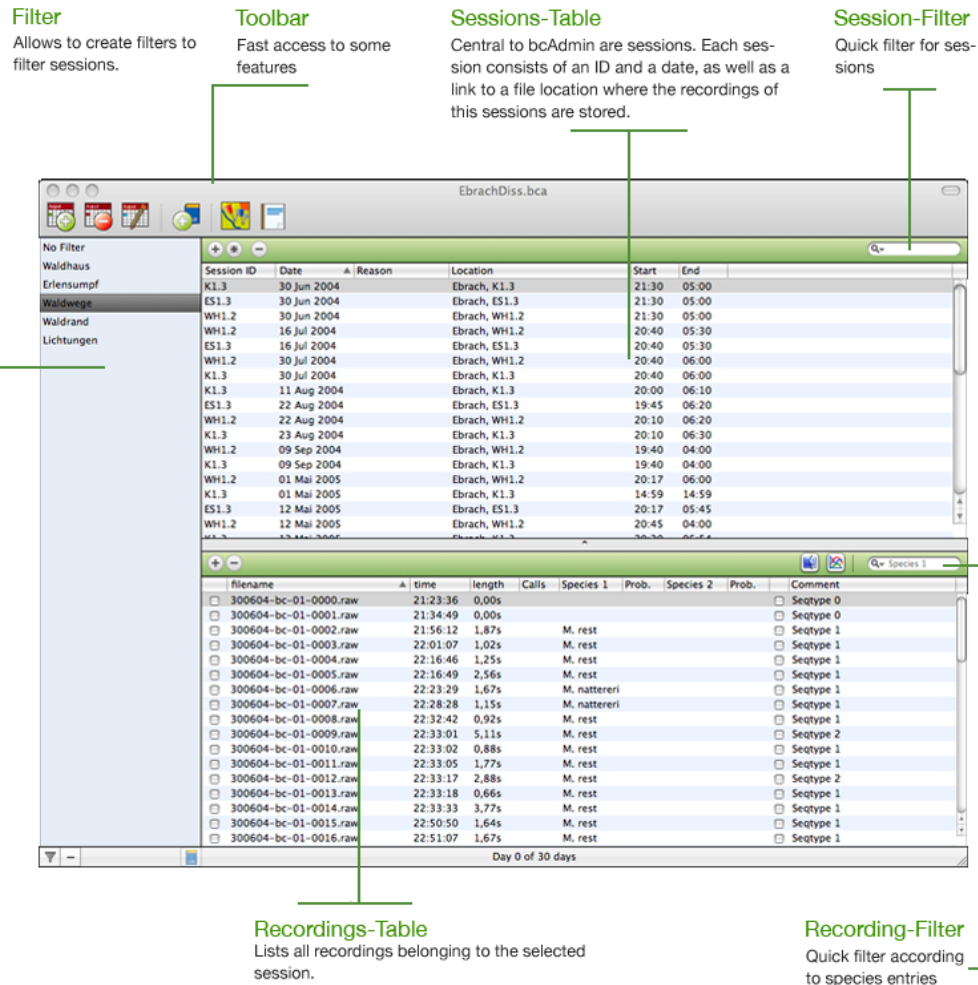


figure: main window of bcAdmin

3. Creation and Editing of data sets

bcAdmin's main task is the management of batcorder sessions and their recordings. All available fields (session, recording) are useful for later data analysis and filtering and thus, should be filled as completely as possible.

3.1. Quick intro to loading files/data

The following steps are to outline the process to add new recordings. An automated way will be explained later.

1. Create a location (if not already available)
2. Create a session and edit the necessary fields
3. Copy recordings from SDHC card to your Mac
4. Add the copied recordings to the session
5. Analyze the selected recordings

3.2. Locations

Locations can be maintained with the Locations-Editor. You can access the editor via a button in the toolbar, via **Window -> Editor Windows -> Locations** or from within the sessions editor sheet. The locations editor contains all available locations (left part of the window) and each of these can be selected and edited. Details are therefore displayed in the right window half.

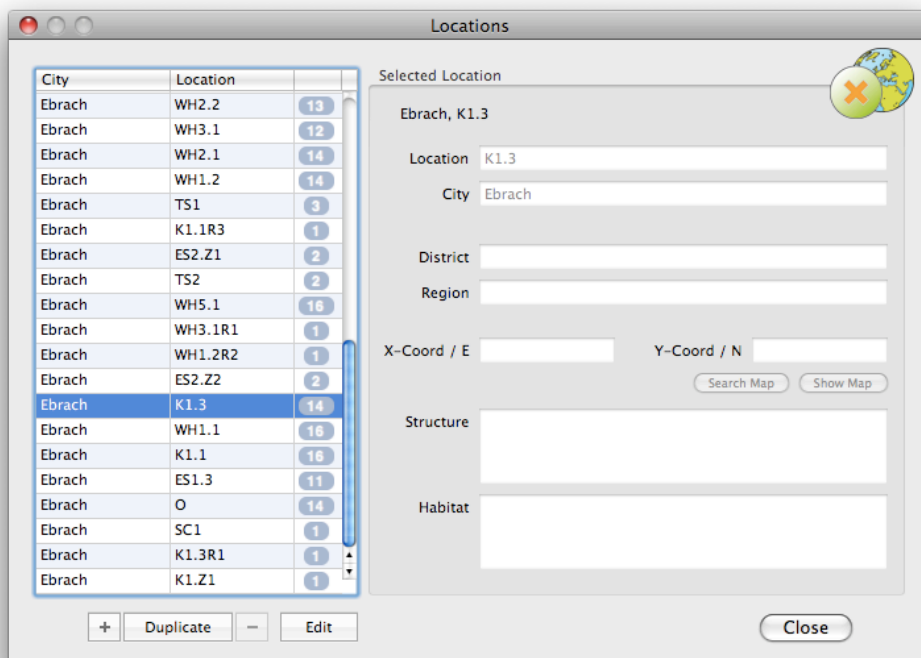


figure: Location-Editor

The number in the last column of the list of all locations shows the number of sessions that were recorded for this location. To edit the details of the selected location you have to activate edit mode via the button below the table. Further buttons allow duplication of a selected location, addition of a new and empty location or deletion of selected locations.

Coordinates can be written in decimal form or in the form of **XX° XX' XX.XXXX"**. These are expected to be in UTM WGS84 format and can be shown in a google map via the button **Show Map**. The coordinate entries are used to calculate sunset and sunrise times.



3.3. Sessions

When importing recordings the first step always should be the creation of a session. Using the + button above the session table a new and empty session entry is created. The * button duplicates an existing entry. After one of these actions the session editor pops up automatically and allows the editing of the session fields.

figure: Session-Editor

If all necessary entries were made the sheet can be closed and recordings can be added. By double click on a session in the table you can always reopen the sheet and edit the fields. There are other possibilities to open

the sheet via the toolbar or the windows menu.

From within the session editor you have quick access to the locations editor. The button **Set from Session Date** allows to quickly fill the **From** and **To** with the session date, which hold start time and stop time of the data acquisition period. If the connected location has entries for x/y coordinate, the sunset and sunrise time can be calculated by pressing **Get from Location**. Via the Finder () button the sessions file location can be opened in a Finder window. The magnify tool () allows to reset the file location.

Note: If the file location is set improperly, the recordings can not be analyzed and calls can not be displayed! Change this setting only if you have moved the files on your hard disk.

If you have moved recordings for multiple sessions on your hard disk, bcAdmin offers the possibility to relocate the file location entries for multiple sessions easily. First, select all sessions you want to change. Then open the session editor via the toolbar button. Most entries will be displayed with „Multiple values“ since you have chosen more than one session. Now click the magnifying glass tool. bcAdmin analyzes the file locations of all selected sessions and extracts the common path. It now allows to relocate the common path to a new location and reconnects all session's file locations again.

3.4. Recordings

batcorder recordings (raw files) are the main reason to use bcAdmin. These recordings should always be connected to a unique session. Thus, they can only be added to the database if a session exists and is selected. Using the + button above the lower table a dialog opens and you can choose the raw files you wish to import.

When importing recordings the session's file location is set automatically, and you receive a warning if recordings from another location were already imported to this session.

The import process automatically reads the file creation/modification date

as well as the length to determine the sound duration. Double clicking a recording entry opens the recording editor sheet and displays recording details. These are entries like species 1 to species 3 and their probabilities. Some fields are secured and can not be edited manually.

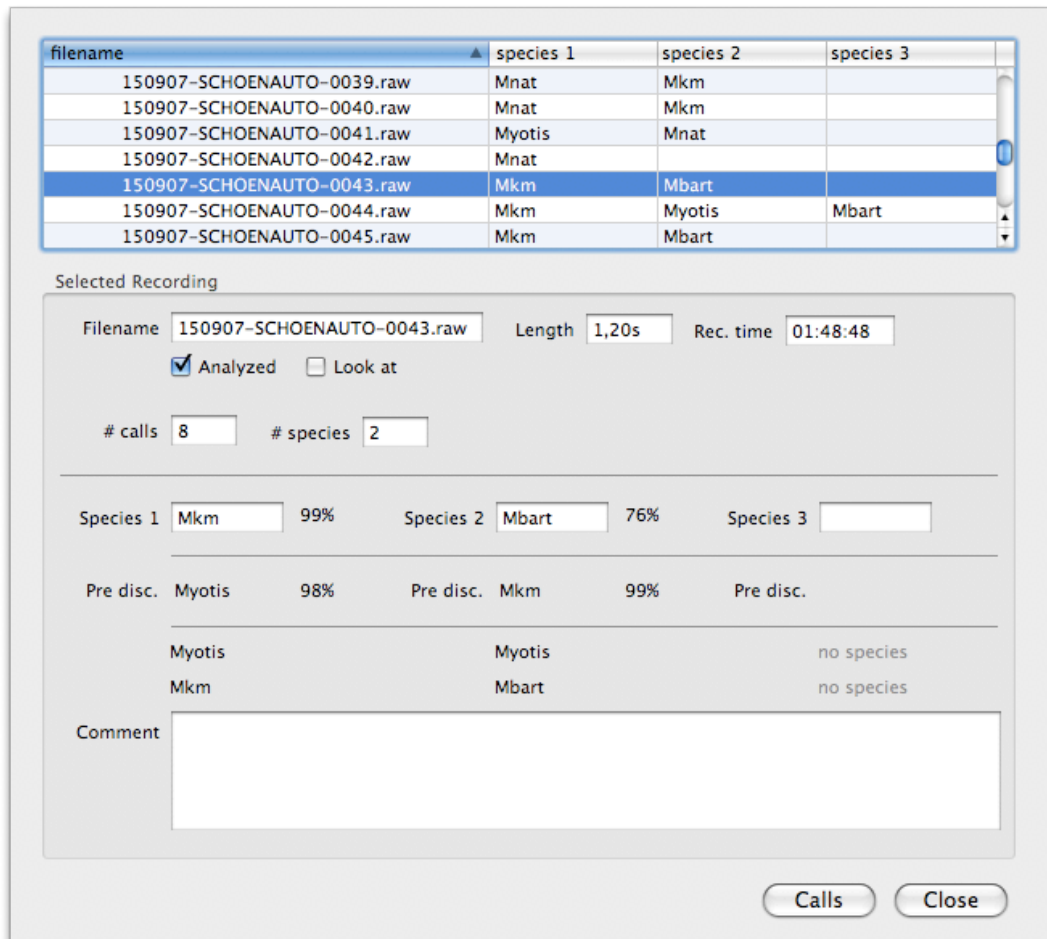


figure: Recording-Editor

If bcDiscriminator results were imported already, these are displayed for each of the three possible species entries. If call measurements are available (.data file), a button to display a call preview is available (Calls).

This call preview or display plots the measurements per call in a sonagram like view. Call intervals are omitted. If bcDiscriminator 1.14 was used, species and probability for each call are added to the display (new feature since 1.15).

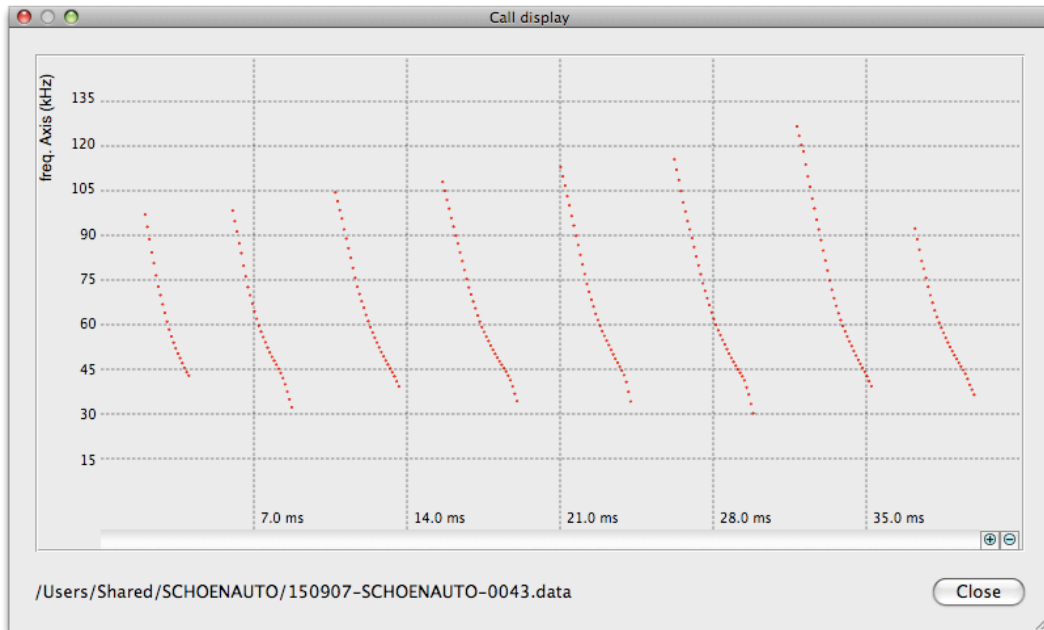


figure: call display window

4. Working with recordings and call analysis

4.1. Automated recordings import

To simplify the import of recordings a special import function exists. This function analyses the content of the SHC card and generates per 24 hour intervals (12 to 12) list of potential sessions and their recordings. To start this process you have to insert the batcorder SDHC card and click on the blue SD card icon¹ in the lower window half. In the first step the SDHC card has to be located in a file choose dialog. Per default it is displayed in the left column of the window next to hard disk and other storage volumes.

¹ The small symbol is only active if a batcorder formatted SDHC card is inserted into the card reader.

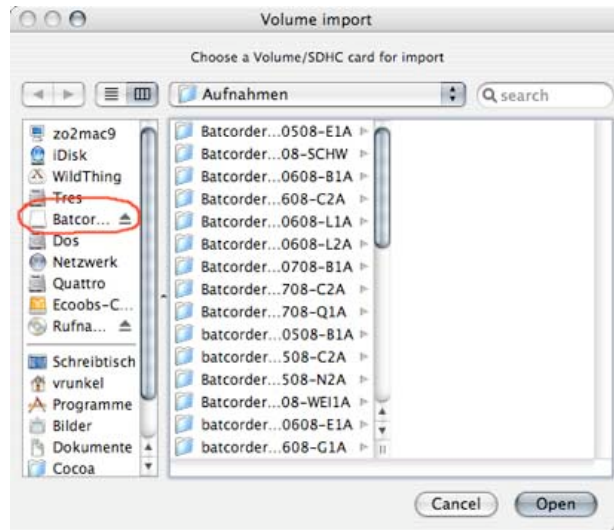


figure: choosing the SDHC card for automated import

After analyzing the SDHC cards content a list of all possible sessions is displayed. Here you can choose single or multiple sessions which should be added with the same meta information to the database. Each session that gets imported is removed from the list. As long as the list is not empty, you can repeat the selection and import of locations. **Cancel** also closes the window.

For importing a couple of details can be pre-filled. Amongst are editor or reason. Required is a target folder on your hard disk. If multiple sessions were selected you can choose to copy the recordings to subfolders within the target folders automatically. These subfolders are named with the session date in the form of YYMMDD automatically.

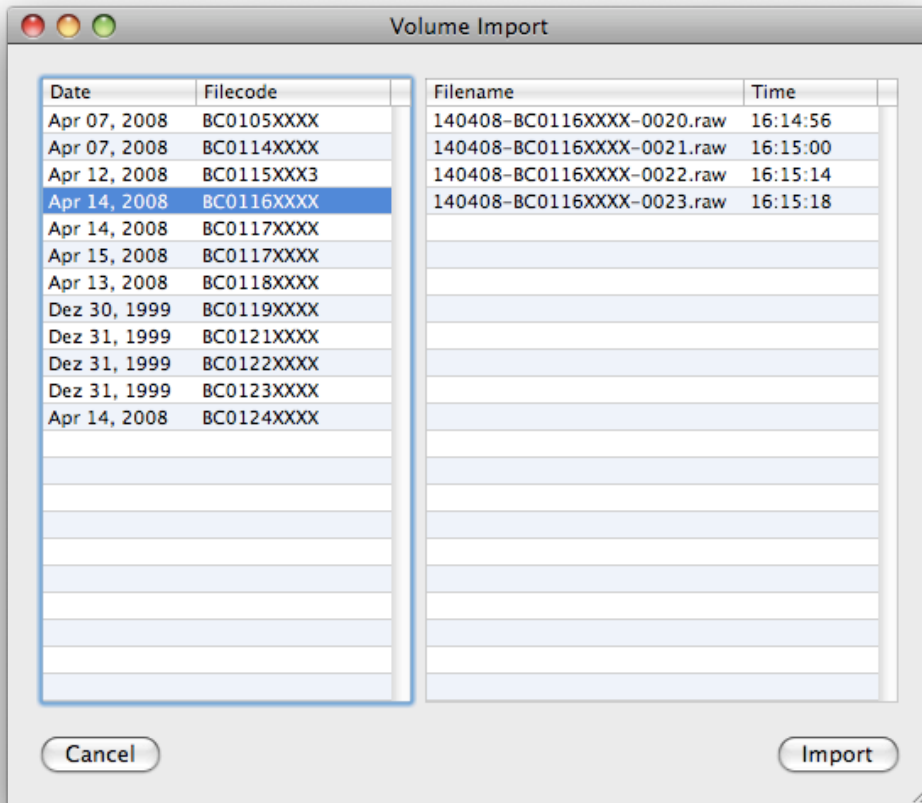


figure: auto import from SDHC card

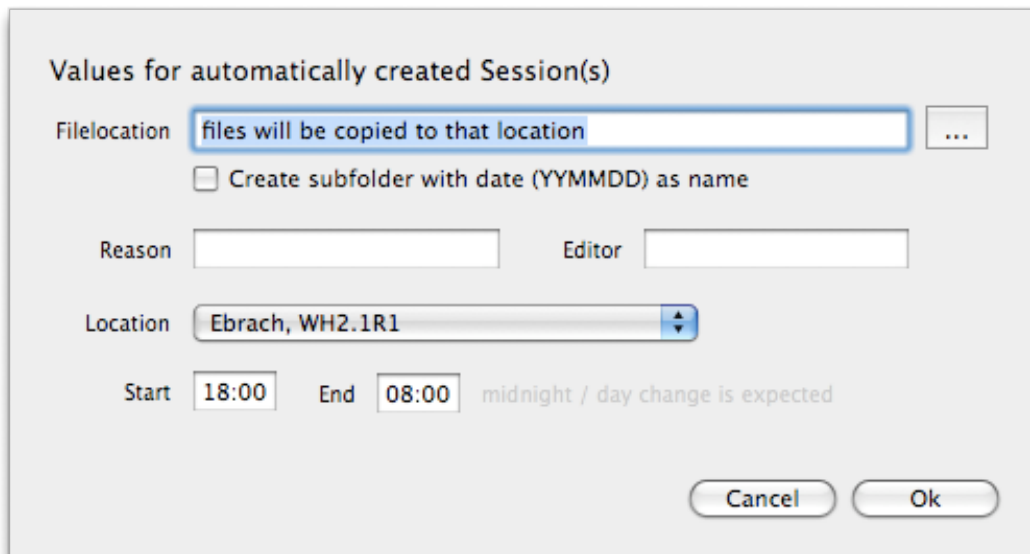


figure: auto import details

4.2. Find and measure calls

One task of high importance within bcAdmin is the search and measuring of calls within recordings. It allows to search for calls of all recordings of a session using a similar algorithm as the batcorder. All calls are saved with their measurements in a data file (call measures over time) and a csv file for species identification using bcDiscriminator.

Use **Recording** -> **Analyse** to start the process. It is important, that the files reside at the folder set as file location in their session. Furthermore the folder must be writable to, otherwise data and csv files can not be produced. Thus, recordings stored for example on DVD can be analysed, but no files can be written for identification etc. . When measuring the calls, call count is set as well as a check in the column analyzed and an entry in species1. This is usually Spec. (bat calls), No Calls (no calls found) and if calls of Rhinolophus species were detected either Rhip or Rfer. These two are missing in bcDiscriminator in its current form, thus bcAdmin looks for these two species and adds them if they are found.

4.3. Import of bcDiscriminator results

bcDiscriminator uses files created by bcAdmin and saves the results in files ending on .res at the same location as the csv files are located. These results can then be imported again into bcAdmin via **Record** -> **Import Results**. The import process extracts species 1 to 3 with relevant probabilities and saves them for each recording. If these results are later changed manually, the probabilities and such are removed again.

An alert is displayed if not for each recording a result file was found. This indicates either some recordings with no calls and thus no csv file or another problem that occurred. When the import is started all previous entries are also deleted to avoid a mix of results of different analysis runs.

4.4. Further methods for working with recordings

Within the menu item **Recordings** some more tools are available. One is

Calc per Nite which uses the nights duration to calculate a percentage of appearance of the recording within the night based on the recording time. Using **Adjust Time** it is possible to shift recording times forward or backward in time. This is useful if the batcorder had a wrong time set. Last but not least **Remove Results** allows to empty the fields that are otherwise filled in the analysis process.

5. Data export

For exporting data a couple of methods are available. Usually these are designed in such a way that they include data from the selection. Thus, it is necessary to select data sets before export is initiated.

5.1. Menu item "Export"

5.1.1. *Export -> Selected Sessions*

This method allows to export selected fields of sessions. using an assistant the fields and their order can be selected and either exported to clipboard or to a csv file. Starting with version 1.15 bcAdmin saves the field and order information and restores it for the next export event.

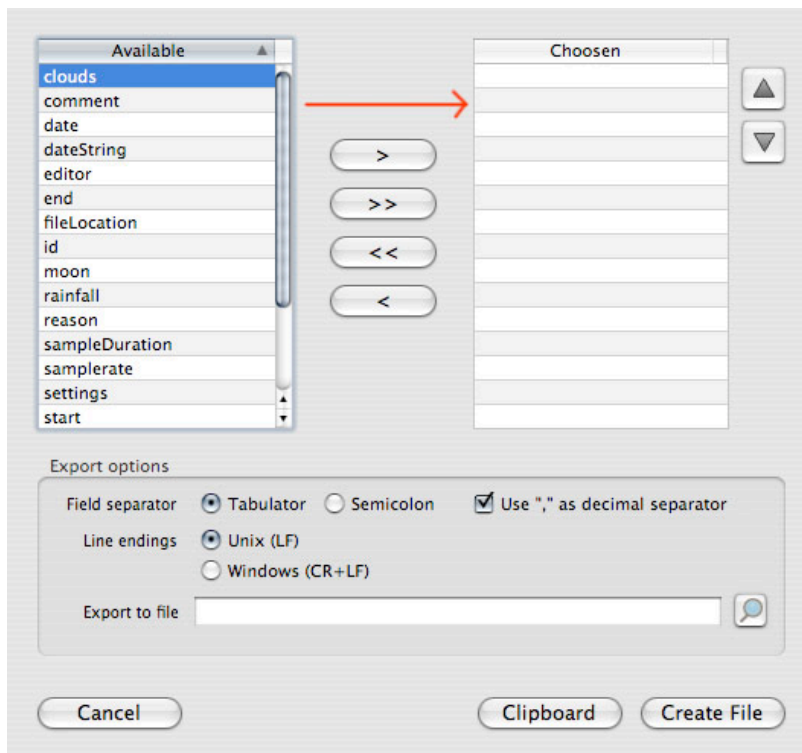


figure: Export of sessions; field selection

5.1.2. Export -> Selected Recordings

The same method as described before, this time based on the selected recordings, or, if multiple sessions were selected, for all recordings of these sessions.

5.1.3. Export -> Location Export

Export of all locations.

5.2. Graphical display of nightly activity

For reports you can create graphs that display the activity recorded for a session throughout the night. Just select the interesting recordings and create or just a single one for computing the whole night. In the opening window you can manipulate the display in different ways, like choosing other bin widths or selecting/deselecting single species. Recordings with

no species entry or no calls are not plotted. The graph can be exported to PDF, copied to the clipboard or the values of each bin can be exported as csv data.

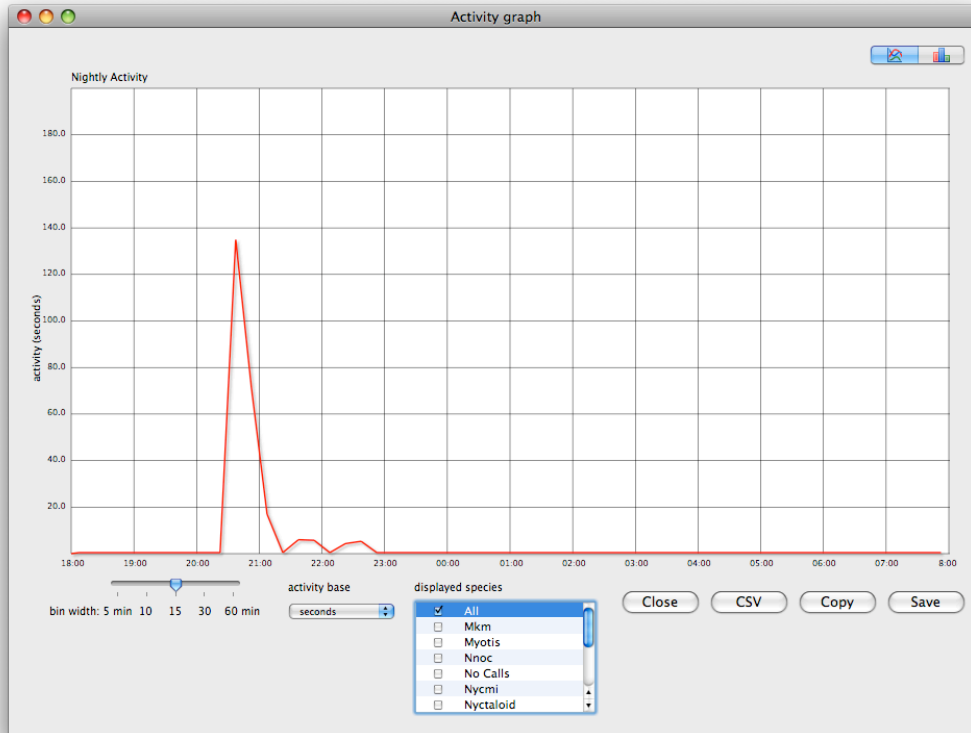


figure: activity graph

If information on start/stop and sunset/rise are available, these are plotted as green (time frame with acquisition) and gray (sunset/rise) areas behind the bars.

5.3. Report Assistant

The report assistant allows to extract and summarize data for reports. The most interesting function is to combine and plot multiple sessions. Different fields can act as combination value.

5.3.1. Combining or summarizing activity

You can combine different sessions for a single report table. Using the popup **activity based on** you can switch which species niveau should be used for the resulting table. By choosing Session, Date, or Reason you can choose which field acts for combining sessions in the report. Furthermore you can use different activity measurements.

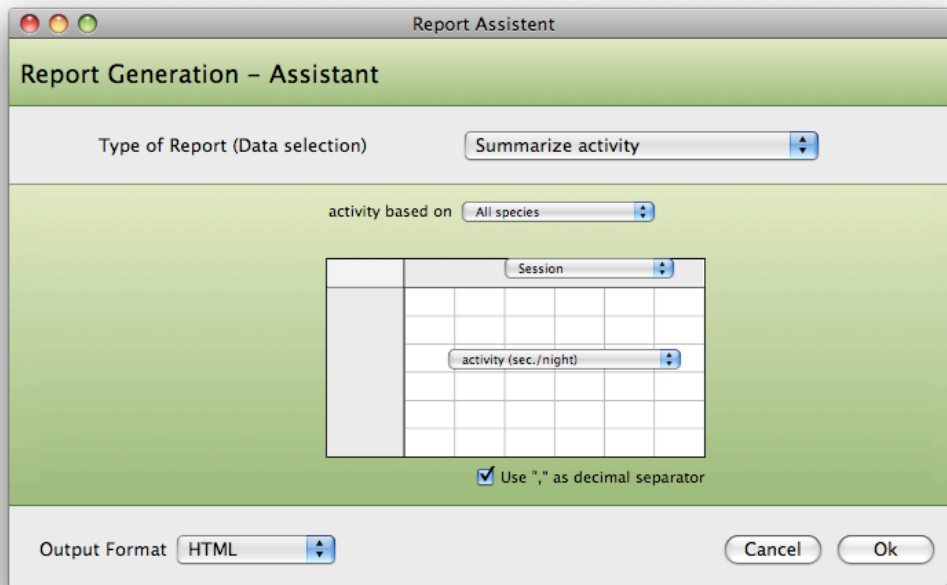


figure: Report Assistant

If HTML is chosen as output format, it is displayed directly. RTF/Word reports are written to file.

6. Further Functions and facts

6.1. More than one database file

By default bcAdmin stores all information in a single database file. You can choose to create additional files for storing project relevant sessions etc. in these. **File -> Save As** or **File -> New** can be used to create new database files.

At the moment different database files can not be merged. This a feature that we have planned for future releases.

6.2. Default database location

bcAdmin saves the main database file per default to the folder **Library/ Application Support/bcAdmin** within your user folder. We recommend you do regular backups of this folder to avoid loss of data in case of a crash.

7. Preferences

The available preferences of bcAdmin allow to customize some of its behaviour:

7.1. General Preferences

The general preferences customize the looks of bcAdmin:

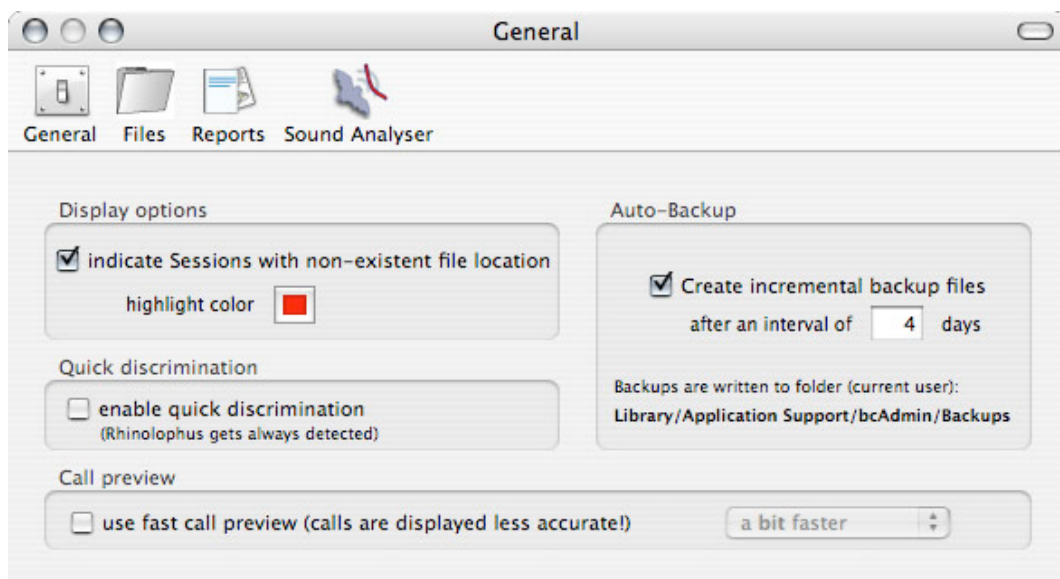


figure: general preferences

Indicate sessions with non-existent file location: If this box is checked entries in the session table are highlighted if their file location could not be located on the disk. This is useful to identify sessions which files were copied or deleted easily. **Auto-Backup** creates backup files at defined intervals if the checkbox is set. The backup files are saved to the folder `~/Library/Application Support/bcAdmin/Backups`. Activating **Quick discrimination** enables a first, very simple species identification. This is rather inaccurate and is not a replacement for bcDiscriminator. It is deactivated per default, then only Rhip and Rfer (*Rhinolophids*) are detected and reported. For older Apple computers you can increase the performance of the **Call preview** by activating a faster display routine. You can also choose the amount of performance improve, which goes with a loss of accuracy since some measurements within calls are omitted.

7.2. Preferences: "Files"

Here you can choose how to deal with files in various functions of bcAdmin.

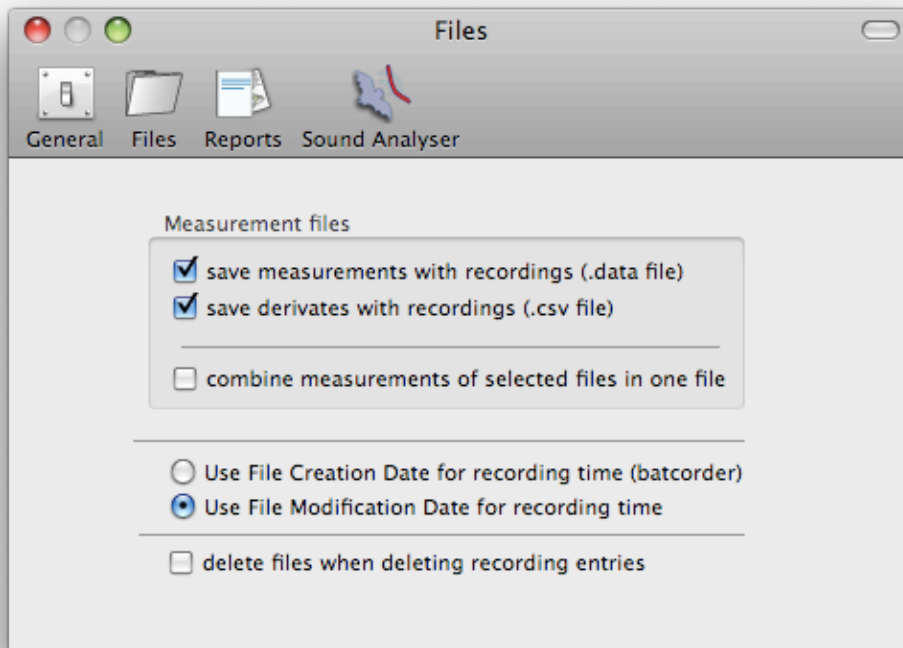


figure: Files preferences

(Measurement files:

- Original measurements per call are saved to an XML file (.data), these are used for the call preview in bcAdmin and bcAnalyze
- Derived measurements are saved to csv files and used by bcDiscriminator
- Measurements of all recordings are written to one large single file

You can choose to use creation or modification date of files for setting the time entry in recordings.

If **Delete files when deleting recording entries** is selected, recording

files are deleted whenever you remove recordings from the recordings table. There is no undo for this step!

7.3. Reports

You can set the time frame used for calculations (night/acquisition time) as well as preset the data format for exporting csv files.

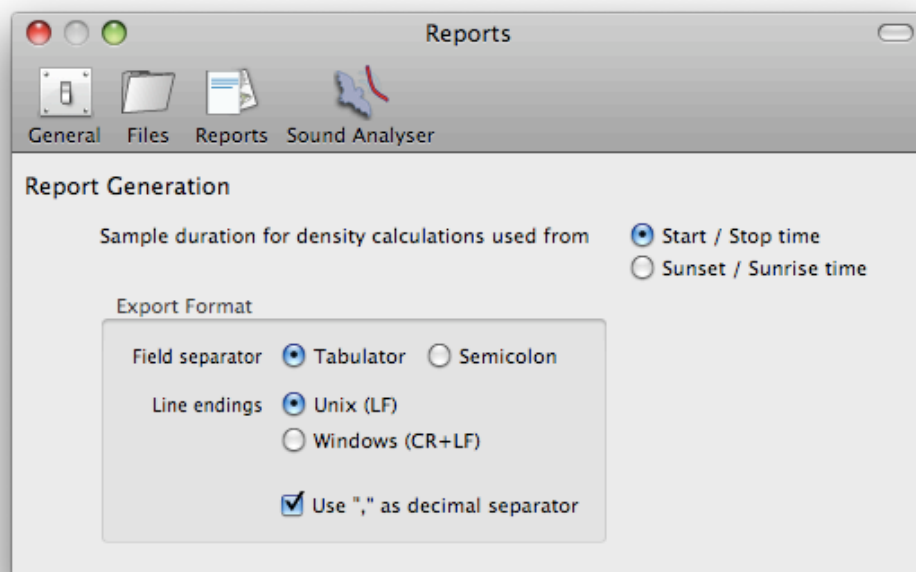


figure: Report preferences

7.4. Sound Analyser

The settings here are to be changed only with caution, since they influence the call finder as well as the measurement algorithm. Wrong settings may lead to unusable results for identification:

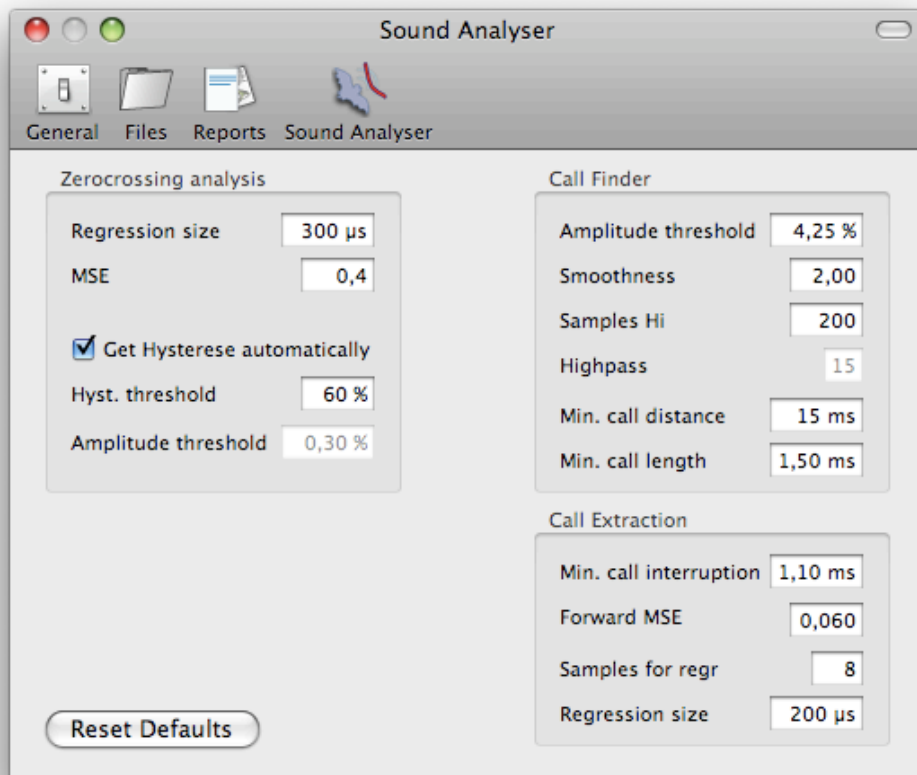


figure: preferences of the Sound Analysers

Zero Crossing Analysis

After finding calls within the recording these get measured using a form of zero-crossing analysis. In this process call quality parameters are evaluated.

- **Regression size** = 300 μ s, for signal detection and smoothing of measurements
- **MSE** = 0.4, influences the accuracy of frequency computations
- **Get Hysteresis automatically:** either use a percentage of the noise in the recording or a fixed amplitude value (in percent)

Call Finder

These settings influence the finding of calls within the recording:

- **Amplitude threshold** = 4.5%, amplitude a call has to reach at minimum to be accepted as a call. It is given as percentage of full amplitude. If the batcorder is set to -27 dB this would be for example ca. 4.5%. Please choose a value according to the settings of the batcorder
- **Smoothness** = 2.0, the same as Quality in the batcorder, it determines when a signal is a bad call and when not.
- **Samples Hi** = 200, another quality measurement
- **Min. call distance** = 15 ms, minimum distance between signals so they are accepted as calls.
- **Min. call length** = 1.5 ms, minimal call length, shorter calls are not analyzed

Call extraction

The computation of measurements can be influenced with the following settings:

- **Min. call interruption** = 1.10 ms, interruption within calls that is still accepted and interpolated.
- **Forward MSE** = 0.06, influences when to stop measuring based on call quality
- **Samples for regr** = 8, influences when to decide that a call ends
- **Regression size** = 200 μ s, is important for the measurement creation over the call duration

8. Licensing

To use bcAdmin after the trial period of 30 days you need to obtain a license from Runkel, Marckmann und Schuster GbR. The license is bound to a single Mac. To achieve this, bcAdmin evaluates the Mac serial number and creates a hash number from it. Based on this number we create a license file that can be used to activate the application. Therefore we need this number to send you a license file.

From this number we cannot recreate the serial number, thus it is safe to send it to us. We gain no knowledge of your Mac. If you need further license for computers that are for example used in the field, we may give out a second free license, but we have to decide this for each single case. We can not give out free licenses if two computers are used more or less simultaneously.

9. Database structure

To help you understand bcAdmin's inner working better, we explain the main database tables in this chapter. Three tables are used to store all the data. These are a locations table, a sessions table and a recordings table. The following figure gives a draft overview of their connection:

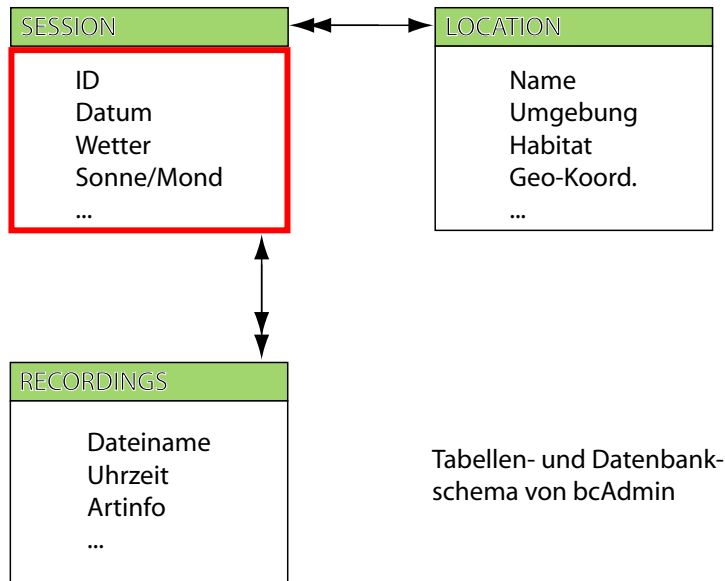


figure: database schema (simplified)

9.1. Sessions

Acquisition of activity with the batcorder usually happens for a whole night at a single location - this unit we call session. A session is always bound to a date and has a unique id, resembling the batcorder file code to allow for quick recognition of recordings. Furthermore information on weather, sun times and such are stored in this table for each session.

Table: Fields for sessions, automatically filed fields are backed gray

1. Name	1. Typ	1. Beschreibung
ID	String (10 tokens)	Descriptor of the session, optimally set to the batcorder file code
Date	date	date of acquisition

1. Name	1. Typ	1. Beschreibung
Reason	String	Reason for acquisition
Editor	String	Editor: name or abbreviation
From	date/time	Start of sampling
To	date/time	end of sampling
Sunset	date/time	Sunset
Sunrise	date/time	Sunrise
Temp (max)	number	max temperature
Temp (min)	number	min temperature
Clouds	String	cloud status
Wind	String	wind
Rainfall	String	rainfall
Moon	number	moon
Comment	String	comment
Settings	String	batcorder settings
Samplerate	number	samplerate of the recordings
Filelocation	String	path for recordings
Location	relationship	link to the location

9.2. Locations

The location table contains all locations and relevant information.

Table: Fields for locations, automatically filed fields are backed gray

1. Name	1. Typ	1. Beschreibung
Link	string	name, concatenation of location and city
Location	string	location name

1. Name	1. Typ	1. Beschreibung
City	string	closest city
District	string	district
Region	string	region
X-Coord	number	longitude
Y-Coord	number	latitude
Structure	string	location habitat structure
Habitat	string	location habitat

9.3. Recordings

An entry of the recordings table holds all information related to a single recording.

Table: Fields for recordings, automatically filed fields are backed gray

1. Name	1. Typ	1. Beschreibung
Filename	string	file name of the recording
Length	number	length in seconds
Rec. time	time	time of the recording
Analyzed	Bool	shows if calls were analyzed
Look at	Bool	marker for interesting recordings
Species1,2,3	string	first, second, third species
Prob 1,2,3	number	probabilities for 1st to 3rd species
Pre 1,2,3	string	identification result before species was reached
Pre prob 1,2,3	number	probabilities for the pre1 to pre3 entries
Comment	string	comment

10. Tips & Tricks

We have not included a full recording file management into bcAdmin (like iTunes for example does). That way you are free to create your own folder structure according to your requirements. Some of our tips on how to use bcAdmin effectively are summarized in this chapter.

10.1. folder structure for recordings

For reasons like backup of recordings and for a good overview of files we recommend a folder structure similar to the one described in the following. It is best to have one folder on your hard disk labeled **recordings**. Within this folder a structure mirroring your projects sits at the top level. Within each of these projects you can create a folder for each recording location. In these the recordings are collected, each session in its own folder.

Recordings	ProjectA	SESSIONA	
	ProjectB	SESSIONA	
		SESSIONB	070507
			070607
			070729
		SESSIONC	
			080607
			080609
	ProjectC	SESSIONX	

This scheme has proven useful for archiving recordings and for quickly finding recordings again.