Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Swiss Federal Institute for Forest,
Snow and Landscape Research WSL

Department of
Environmental Systems Science
ETH Zürich

Research Unit
Biodiversity and Conservation Biology
WSL Birmensdorf

Master thesis

# Challenging the predictive power of flight corridor models for bats

**Tina Meier**
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Supervisor: Prof. Dr. Rolf Holderegger, WSL, ETH
Supervisor: Dr. Martin K. Obrist, WSL
Co-Supervisor: Dr. Klaus Ecker, WSL

# ABSTRACT

Increasing human pressure on landscapes and natural environments in the last century led to severe alterations of habitats and to a decline of many native species. Bats are among the most affected species of this development. In summer, females of Greater mouse-eared bats (*Myotis myotis*) and Lesser horseshoe bats (*Rhinolophus hipposideros*) form maternity roosts under roofs of churches, barns or large houses within settlements. For foraging, they commute to forests presumably following a commuting corridor. To predict these corridors, a numeric model based on circuit-theory was established at WSL (Swiss Federal Institute for Forest, Snow and Landscape Research). Three slightly different versions of this model were delivered to be compared: current_advanced, current_subaverag and current_submaximum.

To test the quality of these models, predicted corridors were compared to experimentally measured bat activity at 18 roost locations in Switzerland (9 *M. myotis* roosts and 9 *R. hipposideros* roosts). 16 Batloggers devices were installed around a roost (maximum distance to the roost 777 m), recording bat activity for one night. 8 sampling sites were situated within a predicted corridor and 8 were away from corridors as control sites. Since artificial light is assumed to have a negative impact on bat activity, but prior attempts to include a light variable into the model failed, we manually measured illuminance (Lux-values) at every sampling site. For statistical analysis, we implemented a generalized linear mixed-effects model (GLMM) to determine the influence of variables of interest on bat activity, while simultaneously taking random effects into account.

We demonstrated highly significant negative effects of artificial light on commuting activity of both species examined. The Lux estimate value of the best performing model for *M. myotis* is -0.398, while the value for *R. hipposideros* is -15.829. Furthermore, comparison of the ratio of bat activity at dark and lit sites indicates that *R. hipposideros* is more sensitive to light than *M. myotis*.

Reliability of the predictive corridor models could not be proven satisfyingly. For *M. myotis* there was no significant effect of the commuting corridor model on bat activity. However, the *R. hipposideros* model including the numeric corridor model of “current_adv” performed best and showed positive correlation with measured bat activity. Yet, in all analyses the other variables examined showed considerably higher effect on bat activity than the predictive corridor model, in particular the variable of light. Further adaption of the predictive commuting corridor model should therefore concentrate on the inclusion of the light variable.

**Keywords**: Chiroptera, habitat modelling, commuting corridors, *Myotis myotis*, *Rhinolophus hipposideros*, echolocation, light disturbance, generalized linear mixed modelling

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| | | |
|---|---|---|
| BAFU | = | Bundesamt für Umwelt =Federal Office for the Environment (FOEN) |
| FOEN | = | Federal Office for the Environment |
| GIS | = | Geographic Information System |
| GLMM | = | Generalized linear mixed-effects model |
| LCP | = | Least Cost Path |
| *M. myotis* | = | *Myotis myotis* = Greater mouse-eared bat |
| *MMY* | = | *Myotis myotis* |
| *R. hipposideros* | = | *Rhinolophus hipposideros* = Lesser horseshoe bat |
| SSF | = | Stiftung zum Schutze unserer Fledermäuse in der Schweiz = Foundation for the Protection of Swiss bats |
| SWILD | = | Name of local Urban Ecology & Wildlife Research Organisation |
| WSL | = | Swiss Federal Institute for Forest, Snow and Landscape Research |

# INTRODUCTION

Increasing human pressure on landscapes and natural environments in the last century led to a worldwide loss of habitat, which emerged to one of the most important issues within wildlife protection in recent decades. One factor for the reduction of habitat areas is direct conversion of natural habitats into settlements and industrially used areas. Besides this, altered landscape composition, as well as fragmentation of habitats, and consequently reduced connectivity of the remaining patches, worsened the situation of wildlife further (EFA, 2011; Grimm et al., 2008; Stoate et al., 2001). Switzerland's landscape is no exception in this development. Settlement expansion, intensification of agriculture and changed silvicultural practices led to a decline of many native species and made them appear on the Red List of Switzerland (Bundesamt für Umwelt, 2016).

Bats are among these endangered species (Bohnenstengel et al., 2014) and they are particularly sensitive to the above-mentioned land-use changes. Many bat species live in close vicinity of humans as they form maternity roosts under roofs of churches, barns or large houses (Güttinger, 1994; Drescher, 2004; Berkova et al., 2014). These roosting sites are in most cases protected by Swiss legislation (NHG – Natur- und Heimatschutzgesetz). For foraging some native species fly into forests and to forest edges daily. While those foraging areas are protected by the Federal Act on Forest (WaG - Waldgesetz), the flight paths in between these two habitats remain highly exposed to changes in urban and rural areas. Close to the roost within settlement areas bats face constraints due to artificial light. Several studies reported negative effects of the increasing level of artificially lighted areas on various bat species, such as different time of the fly-out and avoidance of light (Stone et al., 2012; Downs et al., 2003; Stone et al., 2009). Outside the settlement areas bats frequently have to pass agriculturally managed land, which has been altered as mentioned above, and therefore are not suitable for bats' echolocation orientation anymore. The actual flight paths of bats, commonly referred to as commuting corridors, are mostly unknown. This, although their existence has been discussed for a long time (Limpens & Kapteyn, 1991; Walsh & Harris, 1996). In fact, there is still a lack of knowledge about where these corridors effectively are, how to assess them, and how strongly bats depend on linear structures within their commuting corridors.

Protection of habitats is a major goal of conservation strategies, therefore these habitats must be known in the first place. For this purpose, Ravessoud (2017) established a numeric corridor model at WSL (Swiss Federal Institute for Forest, Snow and Landscape Research). Based on LIDAR data and the application of GIS-Software, commuting flyways of two native species (*Myotis myotis* and *Rhinolophus hipposideros*) can be predicted and made visible.

There is considerable demand for this predictive model by bat conservationists and landscape planners. The model contributes to a better understanding of commuting flyways of bats and it may help to evaluate areas in need of (further) species-specific conservation measures. In addition, it might also become an important tool in urban planning processes, e.g. street lighting regimes. Before going public and applying the model to all known roosts of *M. myotis* and *R. hipposideros* in Switzerland verification of the model's predictions needs to be done.

Therefore, the modelled outcomes were compared to empirically recorded bat activity on 18 locations (9 roosts *M. myotis* & 9 roosts *R. hipposideros*) throughout northern Switzerland. Furthermore, illuminance was measured at every recording site and incorporated in the generalized linear mixed model (GLMM) used for evaluation. Moreover, variables such as the weather, roost size, recording date or distance of the sampling site to its nearest Least Cost Path were taken into account. Lower bat activity was expected at sampling sites not lying within a predicted commuting corridor, e.g. with a low calculated corridor value, and at sites with high artificial light intensity. The overall aims of this master thesis were to A) test the output of the GIS-based corridor model developed by Ravessoud (2017) by comparing them to experimentally recorded bat activity; and B) assess the impact of artificial light on the flight activity of the two examined bat species.

# MATERIAL AND METHODS

Study species

In the study of Ravessoud (2017) the selection of the two species, for which the model is developed, is justified by three criteria: A) species must be an evidential commuting species (spatially separated roost and foraging area); B) distribution and foraging areas should be well known, and C) local knowledge, such as current status of the roost should be available. These criteria qualify the two native species of Greater mouse-eared bat *Myotis myotis* and Lesser horseshoe bat *Rhinolophus hipposideros*.

*Myotis myotis* typically establishes nursery colonies under roofs of churches, barns or large houses within settlements (Güttinger, 1994; Drescher, 2004; Berkova et al., 2014), and hunts in and near deciduous forests, above freshly mown meadows, and in orchards (Güttinger, 1997; Zahn et al., 2005; Drescher, 2004). The main food sources for *M. myotis* are species of the order Coleoptera, with ground beetles (Carabidae) accounting for most of it (Graclik & Wasielewski, 2012; Steck & Güttinger, 2006). Greater mouse-eared bats are assumed to be dependent on structures, but also to be capable of passing open land for some distance. Arlettaz (1996) ascertained an average commuting distance of *M. myotis* of 8.5 $\pm$ 7 km. The local commuting flyways are mostly unknown, although at some roosts attempts were made to follow out-flying individuals by foot to find out about their routes (Lea Morf, Bat Protection Responsible, pers. communication). *M. myotis* currently holds the status of a vulnerable bat species in the Swiss red list of bats (Bohnenstengel et al., 2004). At the same time, it is considered a species of highest priority (Bundesamt für Umwelt, 2011).

*Rhinolophus hipposideros* roosts are found in church attics of the nave and in undisturbed attics of old houses. For foraging they usually commute to light broadleaf forests in close vicinity. Bontadina et al. (2002) reported commuting distances of 600 meters as most common for foraging activity (max. 2.4 km) , while Holzhaider et al. (2002) measured an average commuting distance of 2.4 km (max. 3.6 km). There is strong evidence that this species is highly dependent on vertical structural elements such as hedgerows to navigate from nursing place to feeding place (Motte & Libois, 2002). Furthermore, there is substantial proof that Lesser horseshoe bats react negatively on artificial light. A study by Stone, Jones & Harris (2012) showed that the activity of Lesser horseshoe bats was significantly lower along lit hedges than along unlit ones. Moreover, bats became active significantly later on nights when hedges were illuminated. Lesser horseshoe bats hunt for soft, slow and low-flying insects such as moths and flies (Diptera) (Beck et al, 1989). In the second half of 20$^{th}$ century there has been recorded an immense decline in number of *R. hipposideros* individuals and roosts (Bontadina et al., 2006), mainly due to the destruction of nursing sites by renovations

and the usage of toxic timber preservatives (Stebbings R.E. & Griffith F., 1986; Carravieri & Scheifler, 2013). *R. hipposideros* is on the Swiss red list of bats as an endangered species (Bohnenstengel et al. 2014), although their number has increased slowly but steadily in recent years (SSF - Stiftung zu Schutze unserer Fledermäuse in der Schweiz, Zürich, 2019). The Federal Office for Environment (FOEN) treats them as a species of national priority (Bundesamt für Umwelt BAFU, 2011).

Study sites

For each of the two species 9 suitable study sites were chosen. We focused our study on the northern part of Switzerland according their distribution range: precisely, the Swiss Central Plain and Prealps for *M. myotis*, and Prealps and eastern central Alps for *R. hipposideros*. Southern and western Switzerland was excluded due to missing suitable roosts or logistic reasons.

The criteria for choosing a roost were as followed: A) foraging area is not directly connected to roost, so that bats have to commute at least 60 meters; B) latest counts showed at least 100 individuals living in the roosts (except two roosts of *R. hipposideros* only count 60 individuals, see table 1) and C) the area within 500 meter around the roost is safe and easy to access (neither steep nor loose debris). Most roosts were located within settlements which were situated in an intensively cultivated rural landscape. The studied roosts were selected in coordination with SSF (Foundation for the Protection of Swiss bats). The 18 study sites are shown in figure 1.

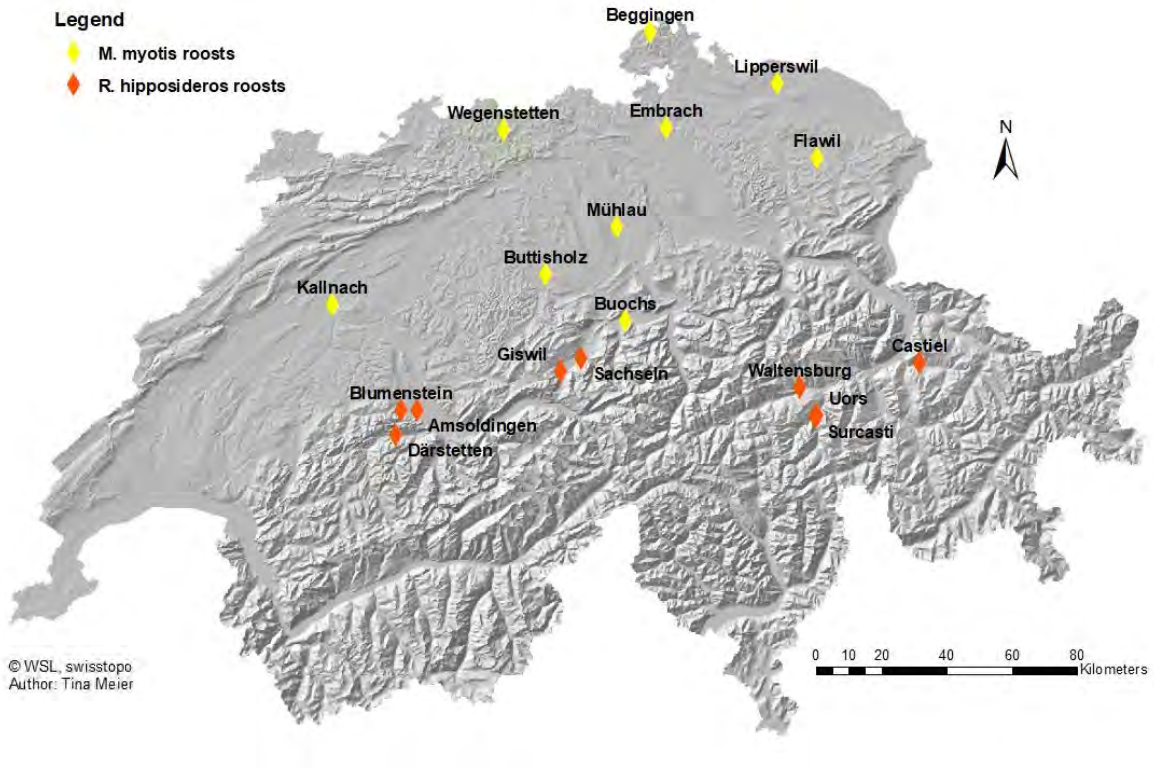


**Figure 1: Study sites of *M. myotis* concentrate on northern Switzerland, while sampled sites for *R. hipposideros* are located in pre alpine communities. Roosts of Surcasti and Uors are situated very close to each other (660 m) and therefore, appear as one icon on the map.**

## Study period

Bats move to their nursery roosts in spring. They give birth to one young, which they lactate for about 6 weeks before it flies out and goes hunting itself. It is assumed that juveniles explore the surrounding on their first fly-outs and gradually adapt to the established flight corridors of the adults. As this study is only interested in the established and frequently used flight corridors, we wanted to have our field survey finished before the juveniles fly out for hunting. Recordings of juveniles on exploration would falsify our detection of commuting corridors. Each roost was sampled one night only. We assumed that the studied species use the same flyways every night and thus, recordings during one night with favourable conditions yielding reliable data. Nights with unfavourable conditions like rain, temperatures below 7 ° C, strong wind and full moon (+/-1 night) were avoided.

May 2019 was unusually cold and wet. Local Bat Protection Responsible informed us, that the inhabitants of our chosen roosts have not yet appeared at the expected time of moving into their summer roosts. In fact, there was a general delay of about 3 weeks in moving into their roosts and gestation of Greater mouse-eared bats and Lesser horseshoe bats throughout Switzerland. A recent study of Linton & Macdonald (2018) found that spring weather con-

ditions indeed influence breeding phenology of bat populations. Hence, our sampling period had to be rescheduled. The first acoustic sampling took place on May 25th in Embrach ZH, the last on July 20th in Flawil SG. The recording dates of all roost sites are disclosed in table 1. Two measurements had to be retaken: 1) Embrach (25.05.2019), because the small number of recorded *M. myotis* on May 25th indicated that not all inhabitants of the roost had yet moved in; and 2) Flawil, where we were caught by an unexpected strong summer thunderstorm on June 19th 2019 (11.6 mm precipitation between 21.00h and 22.00h).

**Table 1: Recording date of all sampled roost as well as its roost size according to the latest count.**

| Species | Roost | 1st Recording | 2nd Recording | Roost size | Last count |
|---|---|---|---|---|---|
| *M. myotis* | Embrach | 25.05.2019 | 17.07.2019 | 298 | 2016 |
| | Mühlau | 06.06.2019 | | 528 | 2019 |
| | Lipperswil | 18.06.2019 | | 186 | 2016 |
| | Flawil | 19.06.2019 | 20.07.2019 | 275 | 2016 |
| | Buochs | 04.07.2019 | | 230 | 2016 |
| | Buttisholz | 05.07.2019 | | 569 | 2016 |
| | Kallnach | 09.07.2019 | | 411 | 2012 |
| | Beggingen | 11.07.2019 | | 630 | 2019 |
| | Wegenstetten | 16.07.2019 | | 200 | 2019 |
| *R. hipposideros* | Blumenstein | 30.05.2019 | | 200 | 2019 |
| | Amsoldingen | 31.05.2019 | | 60 | 2009 |
| | Därstetten | 01.06.2019 | | 110 | 2009 |
| | Sachseln | 12.06.2019 | | 120 | 2016 |
| | Giswil | 13.06.2019 | | 400 | 2017 |
| | Castiel | 24.06.2019 | | 67 | 2017 |
| | Waltensburg | 25.06.2019 | | 105 | 2017 |
| | Uors | 26.06.2019 | | 234 | 2017 |
| | Surcasti | 27.06.2019 | | 202 | 2017 |

Predictive corridor models

In his study, Ravessoud (2017) performed an automatic model selection (LASSO – Least Absolute Shrinkage and Selection Operator) to obtain only the variables with the strongest impact on the response variable. Model selection involved cross-validation using training and testing sets. This way he was able to reduce the former number of 96 variables of the *M. myotis* model to 11 variables, and for the *R. hipposideros* model the variables were diminished from 90 to 7 relevant variables. These variables account for soft ground cover, trees, structures, terrain ruggedness, structure ruggedness and canopy ruggedness.

The appropriate set of variables was applied on our roosts of interest (*M. myotis* resp. *R. hipposideros*) within a frame of 5 x 5 km with a spatial resolution of 5 $m^2$. This resulted in a

Habitat Suitability Map (HSM) which in the next step was transformed into a cost matrix (resistance map) using the inverse of the quality values of the Habitat Suitability. Within this resistance landscape Least-Cost Distance corridors were modelled connecting the roost with possible foraging areas. Further on, the circuit-theory approach was applied in different modes to gain multiple possible paths in the landscape (McRae et al., 2008). Over the last decade the circuit-theory has been widely applied in connectivity science and conservation for its strength to characterize relative frequency of routine movements along various possible paths through urban and other fragmented landscapes (Dickson et al., 2018; Braaker et al., 2014). Here, areas of high current density calculated with Circuitscape Version 4.0 (McRae, Shah & Mohapathra, 2013) represent high likelihood of commuting activity of bats. When modelling with Circuitscape, roosts were set as electric source and surrounding forest patches as grounds.

Within the Circuitscape process different settings of parameters led to various slightly differing current models of which three were selected to be tested in this project.

current_subavg: current between every forest patch and the roost was modelled pairwise and the current values averaged over all possible maps were taken.

current_submax: current between every forest patch and the roost was modelled pairwise and the maximum values considered over all possible maps were taken.

current_adv: with the most recent version of Circuitscape 'advanced' mode was selected, that allowed to set the roost as source, activating all forest polygons as grounds simultaneously.

Table 2 lists the GIS data sets that were available for all test sites. They were used to select sampling sites and derive explanatory variables.

**Table 2: Available GIS data sets for every roost. All roosts were numbered whereby *M. myotis* roosts had number from 101 to 117 and *R. hipposideros* roosts 1001 to 1014.**

| GIS layer | explanation | source |
|---|---|---|
| Roost 44x.shp | location of 44 roosts | © WSL |
| sNR_habitat.shp | Polygons used for computing least-cost corridors in Linkage Mapper and used as source (roost) and ground (forest) in Circuitscape per roost site (NR) | © WSL |
| sNR_roost_point.shp | 1 single roost point | © WSL |
| sNR_subLCPsMerged.shp | Individual Least Cost Paths merged | © WSL |
| sNR_resistance.tif | Resistance used in Circuitscape | © WSL |
| sNR_current_adv.tif | Current version advanced | © WSL |
| sNR_current_submax.tif | Current version pairwise (maximum) | © WSL |
| sNR_current_subavg.tif | Current version pairwise (mean) | © WSL |
| Swissimage\swissimage_rgb_25cm_lv03_2017.lyr | Aerial photo of Switzerland (2017) | © Swisstopo |

As light is considered to have a major impact on bat activity (see Introduction) there was an attempt to implement light data into the corridor model as well. Photos of the earth's surface taken at night by astronauts on the International Space Station (ISS) were tried to fit and geo-referenced on our roosts' surrounding to derive a brightness value for every sampling site. However, this approach was not incorporated into the model due to A) insufficient resolution of the ISS data in rural areas, where most of our roosts were located and B) low correlation of ISS photo values with Lux-values measured at the ground. Therefore, we decided to measure artificial light manually at every sampling site (see Data collection – field work).

Spatial sampling design

We had 16 recording devices available to record bat activity at each study site. The actual place where such an acoustic measurement device was installed is defined as a *sampling site*, whereas, the term *study sites* stands for the roost and its surrounding of about 500 meters. Every sampling site was given a specific site-ID, ranging from site-ID 100 to site-ID 403 (see first column in table 14, Appendix I). One study site, Courtételle with site-IDs 100 to 115, was expelled later due to anomalies in the roost and organizational reasons. Hence, site-IDs in the full data table starts at 116.

To acquire balanced data, we decided to place eight devices within the predicted commuting corridors and eight Batloggers away from predicted corridors as control measurement. In addition, the impact of artificial light on commuting bats was examined. For this purpose, we located eight loggers each, in artificially illuminated sites and unlit places, respectively. This results in four sampling categories, as shown in figure 2.

| | Bright | Dark |
|---|---|---|
| Corridor | 4 batloggers | 4 batloggers |
| Control | 4 batloggers | 4 batloggers |

**Figure 2: Every sampling category was recorded four times at every study site.**

Pre-examination of the location of the roosts and its surrounding and selection of the 16 sampling sites around each roost were done in the office using the software of ArcMap GIS Desktop 10.7 (ERSI Schweiz, Zürich, Switzerland). The software was provided by WSL (Swiss Federal Institute for Forest, Snow and Landscape Research), geographic data and aerial photographs by swisstopo (Federal Office of Topography).

To get a stratified sampling over all study sites in terms of distances of sampling sites to the roost, we first drew three imaginary circles around each roost with radii of 60, 200 and 400 meters. As a guideline we placed four Batloggers on the inner (60 meter radius), eight on the middle (200 meter radius) and four on the outer circle (400 meter radius). This approach should get us a more or less comparable distribution of sampling sites around all examined roosts. However, it was not possible to follow this setting strictly at every study site.

Corridor vs. non-corridor sites were chosen with the layer of current_adv model overlaid on the aerial picture (figure 3 and 4). The chosen sites were also checked against the other two models. They accorded rather well, only very few positional adjustments of sampling sites had to be taken to make all model types equally testable. To distinguish lit and dark places, and to locate street lights and other possible artificial light sources we looked for signs of them in aerial photos and Google street view (Google LLC, Mountain View, California, USA).

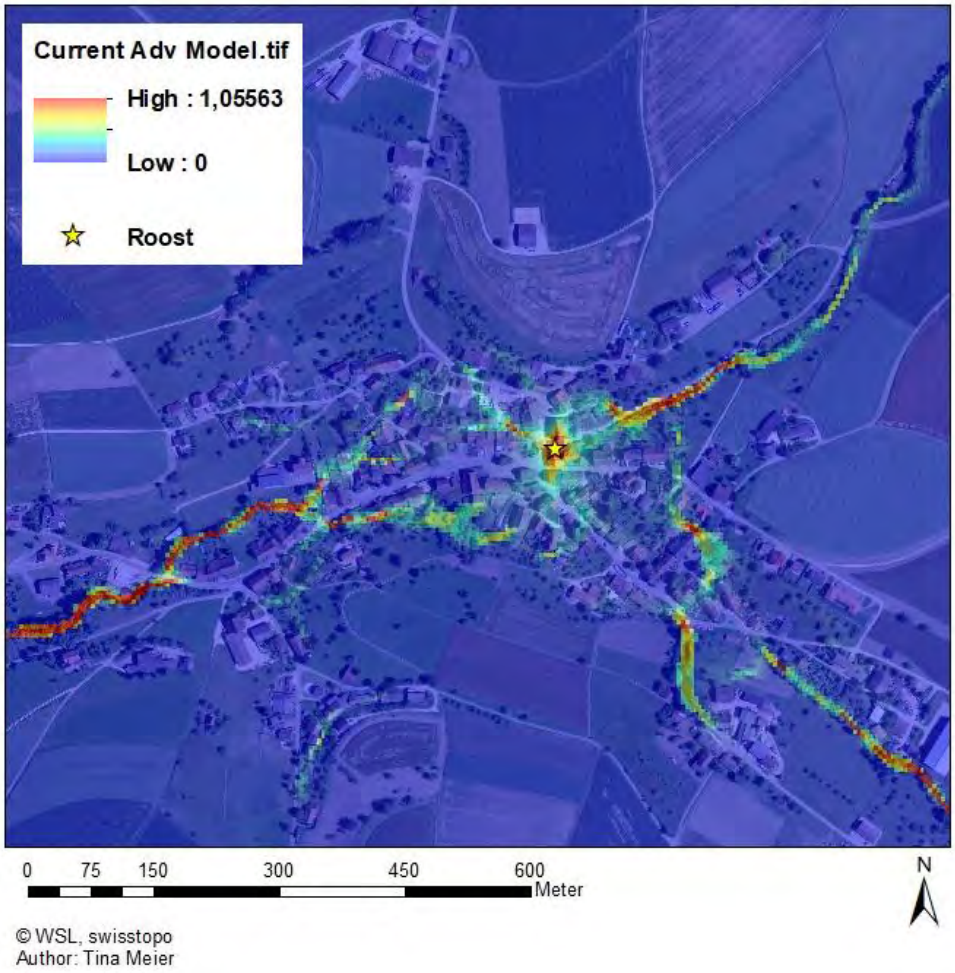


**Figure 3: Model predicted commuting corridors for the roost of Beggingen. High current values (yellow to red) predict strong use of the area as corridor by *M. myotis*.**

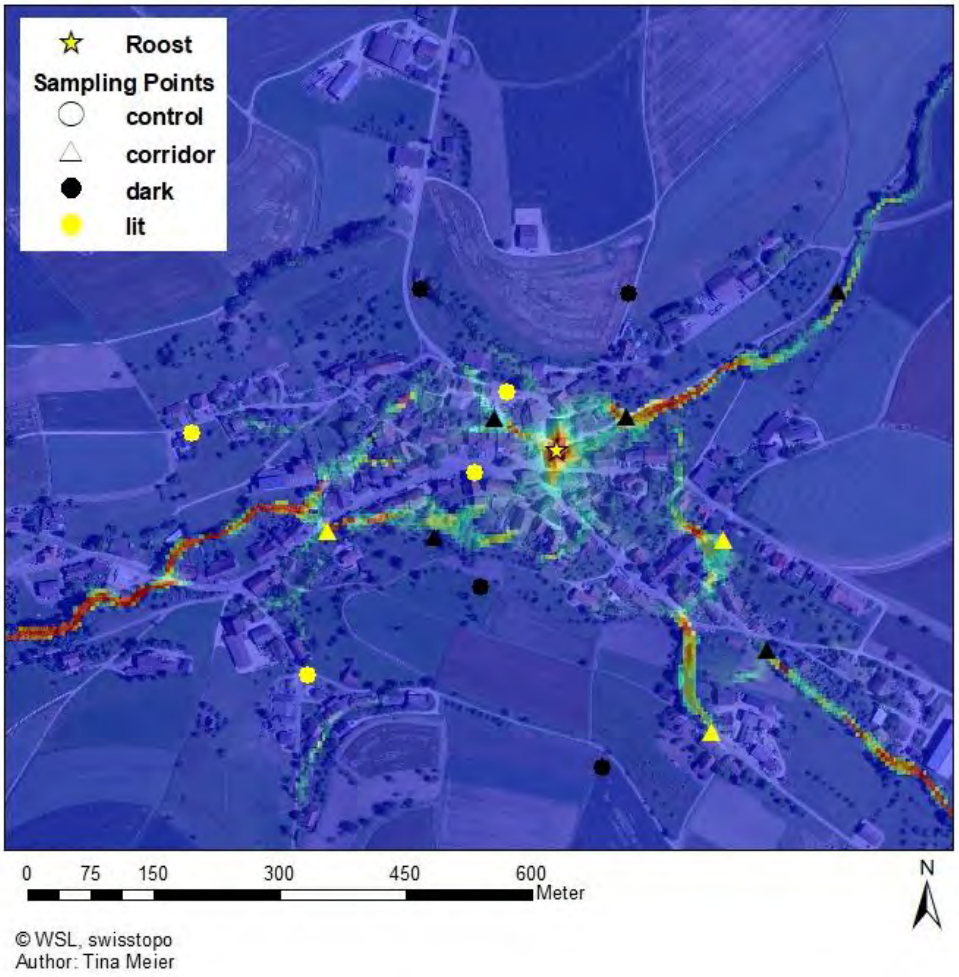


**Figure 4: Sampling sites were chosen while the corridor data set of current_adv was overlaying the aerial photo. Sampling sites within corridors are marked as triangles and control sites as circles. Black icons mark dark places and yellow ones indicate artificially lit sampling sites.**

The recording devices used were provided by WSL, SSF, and SWILD (Urban Ecology & Wildlife Research organisation, Zürich, Switzerland). A Batlogger M (BATLOGGER M, Elekon AG, Lucerne, Switzerland) is an automatic ultrasound recorder with a sensitivity range of 10 kHz to 150 kHz. Prior to field work the recording settings were set as followed. Recordings were carried out for one day, starting 15 minutes before sunset and stopping 15 minutes after sunrise. The recording mode was set to “Period”, so that recording was triggered automatically by tonal ultrasound signals. While recording GPS was enabled, Time Mode was set to “Manual” instead of “Auto Update via GSM”. That is because in earlier field works there occurred leaps in time due to temporal missing GPS signals and consequently resulting in wrong time stamping of recordings. For further settings please see figure 10 in Appendix II.

All recordings were stored as a wav-file which later on we defined as a "sequence" of echolocation calls. For each wav-file, a meta data xml-file recorded date, time, trigger parameters, location as well as temperature. One sequence equates one count of bat activity. Bat activity is defined as a passing of a bat, but not the number of passing bats. One bat could actually pass a recorder several times when flying back and forth. However, we assumed that on their commuting way bats would mainly fly in one direction, namely towards their foraging area, but possibly still pass by multiple recorders.

Data collection – field work

Maps as shown in figure 4 were used to locate sampling sites around a roost in the field. If we encountered unfavourable conditions at an intended sampling site, we had to move it for some meters, looking for a place still fulfilling the same criteria (corridor or non-corridor, dark or lit). Highly frequented roads or noisy watercourses for example are disadvantageous for ultrasound recordings. It also occurred that landowners did not want to have any sort of recording devices on their land, forcing us to look for acceptable replacement.

Batloggers were equipped with an ultrasound microphone, which was attached to a plastic fence post around 1.5 meters above ground (figure 5). The recording device itself was put in a plastic box on the ground to protect it from rain. An information sign with contact details and a "Please, do not touch" remark was affixed to the box. Microphones were fastened pointing in the direction of the roost and slightly towards the ground to protect them from direct rain.

**Figure 5: Example of recording station during the test run at the WSL pond on 10.05.2019. The microphone is attached to a plastic post, the Batlogger is in the plastic box on the ground.**

Sampling sites at a predicted corridor were usually close to a vertical structure, such as hedges or wooded banks. Microphones were then installed in distances of about 3 to 7 meters from the structure, depending on the topographic circumstances. Judging from the characteristics of echolocation calls of the species, we assumed the maximum detection distance of *R. hipposideros* to be 5 meters, which forces them to fly rather close to structures. For *M. myotis* we estimated larger detection range as this species calls at lower fre-

quencies and should therefore be able to capture structures further away. Nevertheless, we went for the same distances of microphones to structures as with *R. hipposideros* sites. Sampling sites lying in the open field (controls, i.e. far from corridors) we tried to place as far away from any structures as possible.

The recording devices were installed in the afternoon usually between 16:00 h and 19:00 h. Site-ID, device number, coordinates, and if necessary particular local conditions were noted. Although Batloggers register GPS coordinates automatically, we captured coordinates manually using a GPS device (GARMIN GPSMAP 62st) as control. Additionally, a photograph of the recording site was taken for documentation.

Around 22:00 h we observed the fly-out of bats and around 22:45 h, when it was dark enough, we started to measure brightness at the sampling sites using a TESTO 540 digital Luxmeter (measuring range: 1 – 99'999 lx; resolution: 1 lx). Light measurements were taken at about 1.5 meter height, once right above the microphone and four times at a distance of 2 meters from the microphone in all directions. For later statistical analysis, the mean of these five measured Lux-values was calculated. Sampling sites that were dangerous to access by night and/or were obviously dark were not actually measured but assumed to be 0 lx.

The next morning all devices were collected, recharged and the recordings saved on a laptop computer as well as an external storage disk. Data were checked for errors and inconsistencies, such as missing spatial references, and were corrected manually. For sampling sites which had to be moved, coordinates were adjusted in ArcGIS.

Analysis of the recordings

All recordings were processed with the software BatScope 4.0 (Obrist & Boesch, 2018). As of now, a single recording shall be referred to as a sequence, in accordance to the term used in BatScope. In a first step, sequences were checked for animal calls and, if successful, cut into individual calls. The method used here is "Period Cutter", an algorithm that detects sinusoidal signal parts identical to the trigger algorithm in the Batloggers, and then cuts sequences in calls of 25 ms length. The calls were then inspected, and the identifying parameters numerically recorded. In a third step, the calls of a sequence were classified automatically. A reference data base containing 27 European bat species is incorporated. In this approach, all six available machine learning algorithms available in BatScope4 were applied to determine the most frequent species in a sequence. The identified species must then be verified manually. Filtering queries can be built referring to automatic classification and characteristics of a species' call to validate or eliminate automatic classification of sequences.

The echolocation of *Rhinolophus hipposideros* is unique for Switzerland. Their calls are at a very high and constant frequency (Peak frequency ≈ 110 kHz). Therefore, automatic classification for this species was considered to be trustworthy and was verified without any further checking. The calls of M*yotis myotis* are less clear, as on the one hand they emit distinct modulated calls and on the other, they call at lower frequencies like several other species. Confusion with calls of *Myotis daubentonii, Myotis bechsteinii, Nyctalus leisleri, Eptesicus nilssoni* and *Eptesicus serotinus* is possible. To test sequences with *Myotis myotis* calls, 17 filter queries were applied (Appendix III) and the resulting sequences checked visually. Only verified sequences were exported to an Excel table for further processing.

Recordings were taken for the whole night. Yet, we were only interested in bat activity reflecting commuting activity. Thus, we had to identify a time slot for the 'fly-out' period. The Excel tools PivotTable and bar chart were used to visualise bat activity over time. Bats of differing roosts flew out at different times depending on local conditions. Therefore, we could not set a fixed time slot for all roost, but had to specify a slot for each roost individually. However, the same duration was specified for all time slots off roosts of the same species.

Selection of explanatory variables

Bat activity during the commuting period is the response variable which is tested against various explanatory variables, as listed in table 3. Characteristics of the field setting, such as the Batlogger device used or the date of the recording night, might have an influence on the survey (e.g. faulty device). Also, the roost size (number of inhabiting bats) has to be considered for statistical analysis. The chapter "Data collection – field work" describes the field measurement of light intensity as a disturbing factor in commuting corridors.

We decided to test each of the three models within two buffer distances at each sampling site. In accordance with the detection distance of *R. hipposideros,* we derived mean current density values (also corridor value) of each model within a five meter radius, using the ArcGIS tool *Focal Statistics* and *Extract Multi Values to Points*. Thereby, higher current density indicates higher likelihood for the existence of a commuting corridor. The second radius of fifteen meters was chosen to consider the longer detection distance of *M. myotis* on the one side and to overcome the rather poor resolution of the models on the other side. The pixel size of all models is 5 x 5 meters. Hence, with a five meter radius, the corridor value only bases on the current density value of one pixel, whereas the fifteen meter radius captures at least nine pixels.

It was not always possible to place a recording device right in the centre of the predicted corridors, but some meters away. We hypothesised that the closer a device to the centre of a

corridor was, the higher the chance of recording all bats passing by would be. Therefore, we referred to the GIS data set of Least Cost Path computed during the development of the models. Our variable consists of the distance between the sampling site and the closest Least Cost Path and was determined using the ArcGIS tool *Near*. In addition, we expected that the distance of a sampling site to the roost would have an impact on the number of recordings at that site.

Bats are known to avoid unfavourable weather conditions (Burles et al., 2009; Rydell, 1989). Thus, we also included the actual weather conditions of the recording night in our statistical analysis. Values from the weather station closest to the sampled roost were extracted. We determined the following four weather variables: temperature, humidity, precipitation and wind speed. Means were calculated by averaging the hourly values from 21:00 h to 24:00 h. All weather data was extracted from the Climap Application by MeteoSchweiz.

**Table 3: All explanatory variables tested statistically on their impact on bat activity.**

| Variable | Code | Source | Value range |
|---|---|---|---|
| Community (location of roost) | Comm | - | - |
| Batlogger device | BL | - | - |
| Day of the Year | DOY | - | 145 - 201 |
| Roost size | R_size | SSF | 60 – 630 |
| Mean of 5 measured Lux-values [lx] | Lux | Field data | 0 – 42.8 |
| Distance of sampling site to roost [m] | Dist_Roost | Field data | 21 – 777 |
| Mean of corridor value of model current_adv within a 5 meter radius | Adv5 | Numeric corridor model | 4.64E-8 – 0.352 |
| Mean of corridor value of model current_adv within a 15 meter radius | Adv15 | Numeric corridor model | 6.34E-8 – 0.466 |
| Mean of corridor value of model current_subavg within a 5 meter radius | Subavg5 | Numeric corridor model | 5.49E-8 – 0.137 |
| Mean of corridor value of model current_subavg within a 15 meter radius | Subavg15 | Numeric corridor model | 5.54E-8 – 0.106 |
| Mean of corridor value of model current_submax within a 5 meter radius | Submax5 | Numeric corridor model | 8.32E-8 – 0.138 |
| Mean of corridor value of model current_submax within a 15 meter radius | Submax15 | Numeric corridor model | 8.39E-8 – 0.134 |
| Distance of sampling site to closest Least Cost Path [m] | Dist_LCP | Numeric corridor model | 0 – 625.6 |
| Mean temperature at recording night between 21.00 – 24.00 [°C] | Temp | MeteoSchweiz | 8.9 – 21.5 |
| Mean relative humidity at recording night between 21.00 – 24.00 [%] | Humi | MeteoSchweiz | 51.1 – 95.5 |
| Mean precipitation at recording night between 21.00 – 24.00 [mm] | Prec | MeteoSchweiz | 0 – 3.9 |
| Mean wind speed at recording night between 21.00 – 24.00 [m/s] | Wind | MeteoSchweiz | 0.3 – 2.6 |

Statistical Analysis

Data were prepared in Microsoft Excel and statistical analyses were performed with the software R Version 3.5.0 (2018-04-23) (R Core Team, 2018). In a first step, numeric explanatory variables were standardized (mean = 0, standard deviation = 1, R-tool: *scale*). Secondly, all explanatory variables were checked for correlation (Spearman Correlation Test, R-tool: *pairs*). Variables with correlation coefficients higher than 0.7 should not be implemented into the same generalized linear mixed-effects model (GLMM) as an explanatory variables' impact on the response variable tends to be less precise if it correlates with another variable. For both species very high correlation emerged among the same GIS-models with different radius sampling of current density values (5 & 15 meters) and also among the three GIS-models themselves (see correlation coefficient matrices in Appendix IV). We decided to only use the fifteen meter current density value models for any further analysis, because the five meter radius current density is based only on one pixel of the Circuitscape data set. In addition, for both species three separate analyses were carried out, each incorporating one of the GIS-model versions. Performance quality of the three GIS-models among each other is compared afterwards. For *R. hipposideros* analysis, correlation emerged also among the variables of 'community' and 'day of the year' as was to be expected. Consequently, the variable of 'community' was dropped. Additionally the correlation coefficient for 'distance to roost' and 'distance to LCP' was 0.71. Nevertheless, we kept both variables for further analysis as we considered both of them relevant and could not comprehend what caused the correlation. Visual check of the response variable (bat activity) revealed a clear 'Poisson' distribution for both species (R-tool: *hist*).

We intended to use an automatic model selection to find the best performing model containing only the most relevant variables. Generalized linear mixed models (GLMM) are appropriate for this purpose and specifically suitable for our data, as they can handle non-normal data (bat activity is count data), and random effects can be taken into account (Bolker et al., 2009). We used the *glmer* tool of the lme4-package (Bates et al., 2015). The *glmer* fits a generalized linear mixed model and incorporates fixed effects parameters as well as random effects via maximum likelihood (Bates et al., 2019). We defined as fixed effects those variables that we assume to have a direct influence on the response variable which we wanted to determine. We set the following variables as fixed effects: current density of one of the GIS-models (Adv15, Subavg15 or Submax15), distance of the sampling point to the roost (Dist_Roost), mean Lux-value (Lux) and distance of the sampling point to its closest Least Cost Path (Dist_LCP). Random effects, on the other hand, are factors whose interest lies in the variation among them rather than their specific effects on the response variable (Bolker

et al., 2009). In this study, we identified eight random effects: the roost itself (Comm), the Batlogger used (BL), what day of the year measurement was taken (DOY), number of inhabiting bats of a roost (R_size) and weather conditions of the specific place and date (temperature, relative humidity, precipitation and wind speed).

With each additional variable, linear models tend to get more and more complex which often results in unsolvable models. To prevent failure (warnings or errors), model complexity can be reduced by manually removing random effects (Bolker et al., 2009). Hence, prior to *glmer,* we implemented a generalized linear model (*glm* of R-package 'stats' (R Core Team, 2018)) with all available variables included and manually removed one after the other variable with insignificant effect (p-value > 0.05) on the response variable. After every removal *glm* model was run again and p-values were checked for changes. This resulted in a model of total nine variables for *M. myotis* and seven variables for *R. hipposideros* (table 4) that was further processed with *glmer*.

**Table 4: GIS model variable in fixed effects is Adv15, Subavg15 or Submax15. Insignificant effects were determined using a *glm*, and therefore dropped from the list of random effects. *There was no precipitation during any measurement of *R. hipposideros* site, thus *glm* generated no output for this variable.**

| effect level | *M. myotis* models | *R. hipposideros* models |
|---|---|---|
| fixed effects | GIS-model<br>Lux<br>Dist_Roost<br>Dist_LCP | GIS-model<br>Lux<br>Dist_Roost<br>Dist_LCP |
| random effects | BL<br>R_size<br>Humi<br>Wind<br>Prec | R_size<br>Humi<br>Wind |
| insignificant effects | Comm<br>DOY<br>Temp | BL<br>Comm<br>DOY<br>Temp<br>Prec* |

An automated model selection (*dredge*, package: MuMIn (Barton, 2019)) was performed on the outputs of *glmer*, ranking models with all possible variable combinations according their AICc value. Akaike information criterion AIC (Akaike, 1998) is an estimate of the quality of each model of a set of statistical models relative to each other model of the set. Thereby, the AIC optimises the trade-off between 'loss of information' and model complexity (Burnham & Anderson, 2004; Harrison et al., 2018). We utilized AICc, which is the corrected value for small sample size analysis. While the individual AICc values are not interpretable, their delta-values (ΔAIC) can be used to select the best model among the set of candidate models. Models with $\Delta AIC \leq 2$ have the same explanatory power and can therefore be regarded as equivalent.

With the command *get.models* (package: MuMIn) and a $\Delta AIC \leq 2$, we selected a set of 'best performing models' of which we computed a final single 'best model' by averaging them using *model.avg* (package: MuMIn). Model averaging was performed for *M. myotis* data, but not necessary for *R. hipposideros* data. The automated model selection rendered one best model for *R. hipposideros* analyses with the second best model having a $\Delta AIC > 9$, and therefore indicating a weaker performance.

# RESULTS

Acoustic recordings & bat activity

Recordings were taken during 20 nights at 318 sampling sites in total, comprising 20 bat roosts. At three sites we did not yield any recordings, either because of incorrect handling of the bat recorder or due to manipulation by strangers. As a result we got a total of 48'358 sequences at *M. myotis* sites and 45'644 sequences at *R. hipposideros* sites, giving a total of 94'002 bat passes recorded.

After automatic classification and manual verification, 1'858 sequences were attributed *to M. myotis* at *M. myotis* sites and 1'357 sequences to *R. hipposideros* at *R. hipposideros sites*. Bat activity plotted over the duration of recording night, as shown in figure 6, exemplary for the roost of Kallnach, helped us to define the 'fly-out' period for each roost. The chosen 'fly-out' slot for *M. myotis* is 1 hour 25 minutes and the one for *R. hipposideros* 1 hour 15 minutes. The exact start and end times of the time slot for all roosts can be found in table 5. At *M. myotis* sites, 1'082 sequences were recorded during the 'fly-out' time slot which accounts for 58 % of total *M. myotis* activity. *R. hipposideros* activities also show peaks shortly after the sunset. In contrast to *M. myotis*, the recording sequences of *R. hipposideros* are more distributed over the whole night and less concentrated at the commuting fly-out period. Hence, only 37% (496 out of 1'357) of *R. hipposideros* activity was recorded within the defined time slot (cf. figure 13 and 14 in Appendix V). The exact numbers of total activity and activity within 'fly-out' period for each study site are listed in table 5.

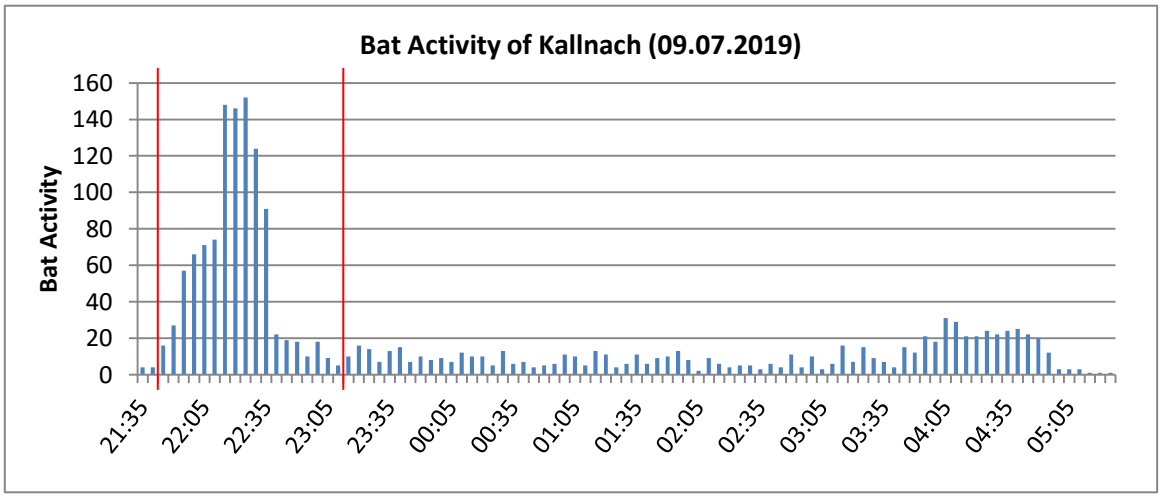


**Figure 6: Total bat activity at 16 recording sites around the roost of Kallnach with peak of fly-out activity between 22:10 h and 22:30 h. The two red lines represent start and end time of the chosen 'fly-out' time slot.**

On both study sites (Embrach, Flawil) where measurements were repeated (see chapter “Study period”), total bat activity was remarkably higher the second time of measurement. The first night in Embrach we recorded 65 sequences of Greater mouse-eared bats, 57 of them within the time slot, whereas in the second measurement we obtained 211 sequences of which 83 were assigned to the ‘fly-out’ period. Similarly, bat activity in Flawil was higher the second time of recording: 192 sequences of total activity in the second recording night, compared to 84 in the first one; and 76 versus 12 sequences within the ‘fly-out’ period. The time slots of these two measurements were identical for both nights.

**Table 5: Start and end times of the 'fly-out' time slots defined for every study site individually. Total activity was measured throughout the whole night, but for analysing commuting activity towards foraging areas, only recorded activity within the 'fly-out' period was relevant. Percentage of activity within the time slot was generally higher for *M. myotis* than for *R. hipposideros* sites.**

| Species | Roost | Rec. Date | Duration | Start | End | Total Activity all night | Total Activity in time slot | % of all Activity |
|---|---|---|---|---|---|---|---|---|
| *M. myotis* | Embrach (1st) | 27.05.2019 | 1 h 25 min | 21.45 | 23.10 | 65 | 57 | 88 |
| | Mühlau | 06.06.2019 | | 22.05 | 23.30 | 87 | 76 | 87 |
| | Lipperswil | 18.06.2019 | | 21.35 | 23.00 | 95 | 70 | 74 |
| | Flawil (1st) | 19.06.2019 | | 21.45 | 23.10 | 84 | 12 | 14 |
| | Buochs | 04.07.2019 | | 22.15 | 23.40 | 55 | 26 | 47 |
| | Buttisholz | 05.07.2019 | | 22.10 | 23.35 | 360 | 255 | 71 |
| | Kallnach | 09.07.2019 | | 21.45 | 23.10 | 346 | 187 | 54 |
| | Beggingen | 11.07.2019 | | 21.45 | 23.10 | 182 | 105 | 58 |
| | Wegenstetten | 16.07.2019 | | 21.45 | 23.10 | 181 | 135 | 75 |
| | Embrach (2nd) | 17.07.2019 | | 21.45 | 23.10 | 211 | 83 | 39 |
| | Flawil (2nd) | 20.07.2019 | | 21.45 | 23.10 | 192 | 76 | 40 |
| | | | | **Total *M. myotis*** | | **1'858** | **1'082** | **58** |
| *R. hipposideros* | Blumenstein | 30.05.2019 | 1 h 15 min | 21.25 | 22.40 | 231 | 72 | 31 |
| | Amsoldingen | 31.05.2019 | | 21.25 | 22.40 | 119 | 39 | 33 |
| | Därstetten | 01.06.2019 | | 21.40 | 22.55 | 148 | 28 | 19 |
| | Sachseln | 12.06.2019 | | 21.25 | 22.40 | 47 | 12 | 26 |
| | Giswil | 13.06.2019 | | 21.55 | 23.10 | 167 | 65 | 39 |
| | Castiel | 24.06.2019 | | 21.25 | 22.40 | 21 | 3 | 14 |
| | Waltensburg | 25.06.2019 | | 21.55 | 23.10 | 74 | 19 | 26 |
| | Uors | 26.06.2019 | | 22.25 | 23.40 | 421 | 196 | 47 |
| | Surcasti | 27.06.2019 | | 21.55 | 23.10 | 129 | 62 | 48 |
| | | | | **Total *R. hipposideros*** | | **1'357** | **496** | **37** |

Differences in bat activity at corridor and control sites

Each study site was sampled the same way concerning corridor and control sites. At *M. myotis* sites we had 88 sites being situated in a corridor and the same number for control sites. For *R. hipposideros* 71 sampling sites were situated in a corridor and 71 outside (control). Table 6 discloses that *M. myotis* bat passes were 2.8-fold higher at corridor sites (798 passes) compared to control sites (284 passes). Hence, there is a significantly higher activity of *M. myotis* at sampling places of modelled corridors (p-value <2e-16). *R. hipposideros* was recorded 311 times at corridor sites in comparison to 185 records at control sites. This difference is also statistically significant (p-value <2e-16).

**Table 6: The number of bat passes is significantly higher at corridor sites than at control sites for both species.**

| Species | Location of sampling sites | Number of sampling sites | Bat passes |
|---|---|---|---|
| *M. myotis* | corridor | 88 | 798 |
| | control | 88 | 284 |
| *R. hipposideros* | corridor | 71 | 311 |
| | control | 71 | 185 |

Light measurements

The mean Lux-values of all measurements range from 0 lx to 42.8 lx. While light measurement resulted in a gradual scale of values, choosing sampling points in daytime was based on the assumption of whether a place would be dark at night with no light source in close vicinity or artificially lit by any kind of light source. For further analyses a reasonable threshold of $\leq$ 0.5 lx was determined to differentiate between dark and artificially lit sites. According this delimiter, it turned out we had sampled a total of 221 dark and 94 lit sites.

Low Lux-values (lx $\leq$ 0.5) evidently occurred more often than high values (table 7). At 108 *M. myotis* sites, the mean Lux-value was lower or equal to 0.5 lx, at 66 sites we measured higher values. 31 of the sites with 0 lx were considered dangerous to access by night (situated on a steep slope and/or pitch darkness), so that a Lux-value of 0 was assumed. However, at 77 other *M. myotis* sampling sites we actually measured mean Lux $\leq$ 0.5. At these 108 dark sites we recorded 869 *M. myotis* passes which accounts for eight bat passes per dark sampling site, whereas 213 passes at 66 sites yield 3.2 bat passes per lit site. Consequently, the ratio of bat passes per dark sites compared to the ones in lit sites is 2.5.

For *R. hipposideros* 113 sampling sites were measured with mean Lux-values lower than 0.5 lx, while 28 sites were affected by artificial light with Lux-values higher than 0.5. Here, 36

sampling sites were not visited and assumed to yield 0 lx, at 77 sites measured mean Lux-values were ≤ 0.5 lx. 485 *R. hipposideros* passes were recorded at these 113 dark sites, yielding in 4.3 bat passes per dark site. At 28 lit places we recorded 11 *R. hipposideros* passes which is 0.4 passes per lit site. The ratio of dark to lit sites concerning Lesser horseshoe bats is 10.9.

For both species a generalized linear model analysis (*glm*) revealed highly significant effects of Lux-values on bat activity (*M. myotis:* estimate: -0.2893; p-value <2e-16; *R. hipposideros:* estimate: -2.3514; p-value 8.84e-14)

**Table 7: There were considerably more dark than lit sampling sites and bat activity was significantly higher at dark sites for both species. The apparent difference in the dark/lit ratio between the two species indicates higher sensitivity to light of *R. hipposideros* than *M. myotis*.**

| Species | Lux category | No. of sites | No. bat passes | No. passes per site | Ratio dark/lit |
|---|---|---|---|---|---|
| *M. myotis* | 0 – 0.5 lx | 108 | 869 | 8.0 | 2.5 |
| | ≥ 0.5 lx | 66 | 213 | 3.2 | |
| *R. hipposideros* | 0 – 0.5 lx | 113 | 485 | 4.3 | 10.9 |
| | ≥ 0.5 lx | 28 | 11 | 0.4 | |

Deriving a best performing model for each species

Generalized linear mixed-effect models (GLMM) were run for both species three times, incorporating one of the GIS-models' current density values each (GLMM 1 to 6). The following tables 8 to 13 show and explain the three best performing models for each *glmer* and *dredge* analysis. The models are ranked according to their AICc values. Models with ΔAIC ≤ 2 have the same explanatory power and can therefore be regarded as equivalent. The full tables of all analyses are given in Appendix VI.

- **GLMM 1: *M. myotis* data including the current_adv GIS model**

**Table 8: The three best performing models for *M. myotis* analysis with current density values of the GIS model Adv15 included.**

| rank | Adv15 | Dist_LCP | Dist_Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.530 |
| 2 | -0.052 | -0.428 | -0.216 | -0.399 | 10 | -848.930 | 1719.209 | 0.237 | 0.470 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 5.85e-8 |

Table 8 classifies the three best performing models for *M. myotis* data including the current density values of GIS Adv15 model. The best ranked model includes explanatory variables of

distance to LCP and roost, as well as the light variable. However, the second-best model, which includes the Adv15 variable, does only have a slightly higher AIC value (deltaAIC = 0.237), wherefore this model the same explanatory power is assigned as the first one. Model three is clearly less powerful (deltaAIC = 32.036) than the first two models. When averaging the first two models, they get weighted similarly strong, as indicated in the last column. All four explanatory variables have a negative impact on our response variable, as figure 7 graphically illustrates. The distance to LCP and the Lux-value have almost the same strongest negative impact on bat activity, while the estimate for Adv15 is close to zero and its confidence intervals cross the zero line.

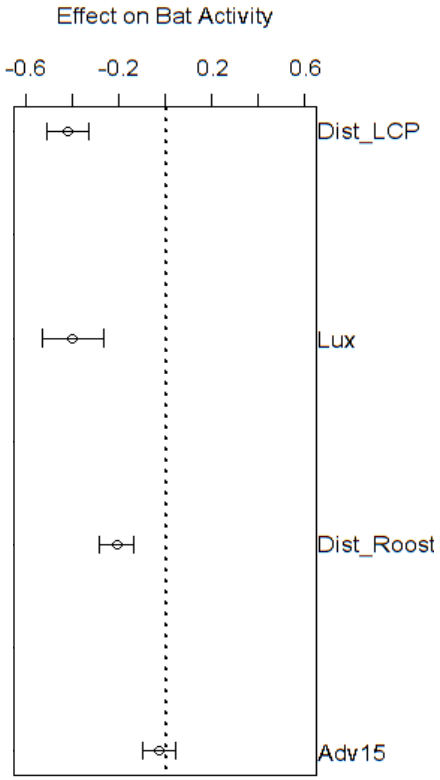


**Figure 7: Analysis of *M. myotis* data including current density values of the GIS model current_adv show negative impacts of all explanatory variables on bat activity. Estimate values: Dist_LCP = -0.417; Lux = -0.398; Dist_Roost = -0.209; Adv15 = -0.025.**

### ➢ GLMM 2: *M. myotis* data including the current_subavg GIS model

**Table 9: The three best performing models for *M. myotis* analysis with current density values of the GIS model Subavg15 included.**

| rank | Subavg15 | Dist_ LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.609 |
| 2 | -0.043 | -0.426 | -0.214 | -0.397 | 10 | -849.255 | 1719.860 | 0.888 | 0.391 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 6.73e-8 |

Again, the best performing model to explain bat activity does not include the current density values of the GIS model, here current_subavg15, but is included in the secondly ranked model (table 9). In fact, this has the same significance as the first model, since the difference in the AICc value is only 0.888. Model three has significantly less explanatory power (deltaA-IC = 32.036). Model one is weighted significantly higher than model two in the model averaging process (cf. column 'weight'). Figure 8 displays effects of all averaged estimates. Like before, distance to LCP and Lux-value have stronger negative effects on bat activity than distance to roost. Current density of the GIS model has an estimate of -0.043 and confidence intervals cross the zero line, indicating little to no impact of the Subavg15 model on the response variable.

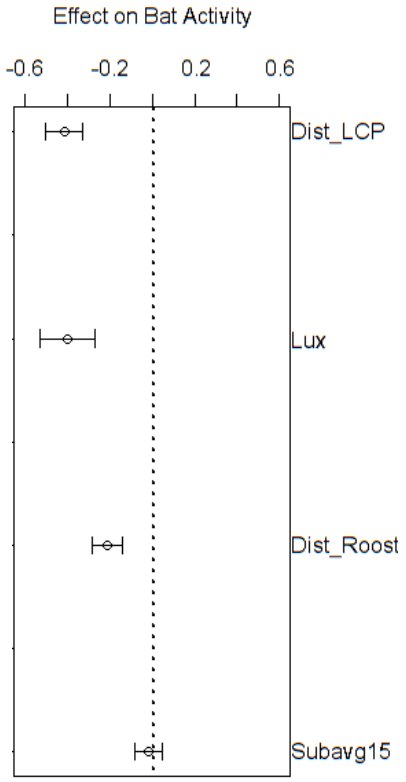


**Figure 8: Analysis of *M. myotis* data including current density values of the GIS model current_subavg show negative impacts of all explanatory variables on bat activity. Estimate values: Dist_LCP = -0.414; Lux = -0.397; Dist_Roost = -0.208; Subavg15 = -0.017.**

### ➢ GLMM 3: *M. myotis* data including the current_submax GIS model

In the 3rd GLMM analysis, current values of the Submax15 GIS model are included (table 10). As before, the best performing model of this set only combines the variables of 'distance to LCP', 'distance to roost' and 'Lux'. Submax15 is incorporated into the secondly ranked model, which has the same strong explanation power as the first one (deltaAIC = 0.695). Once more, the third model is significantly less powerful than the first two (deltaAIC = 32.036).

**Table 10: The three best performing models for *M. myotis* analysis with current density values of the GIS model Submax15 included.**

| rank | Submax15 | Dist_ LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.586 |
| 2 | -0.047 | -0.428 | -0.208 | -0.397 | 10 | -849.159 | 1719.668 | 0.695 | 0.414 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 6.48e-8 |

The first two models were averaged and the estimate values of each explanatory variable were plotted in figure 9. As in the previous analyses, effects of all variables on bat activity are negative. Distance to LCP and Lux-values are similarly stronger than distance to roost, and the estimate of the GIS model Submax15 is again very close to the zero line.

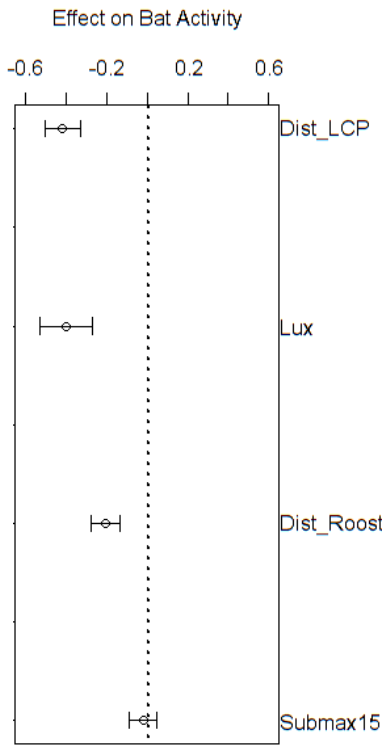


**Figure 9: Analysis of *M. myotis* data including current density values of the GIS model current_submax show negative impacts of all explanatory variables on bat activity. Estimate values: Dist_LCP = -0.415; Lux = -0.397; Dist_Roost = -0.206; Submax15 = -0-019.**

### ➢ GLMM 4: *R. hipposideros* data including the current_adv GIS model

**Table 11: The three best performing models for *R. hipposideros* data with current density values of the GIS model Adv15.**

| rank | Adv15 | Dist_ LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.345 | -0.737 | 0.407 | -15.829 | 8 | -586.655 | 1190.552 | 0.000 | 1.000 |
| 2 | 0.219 | -0.629 | - | -19.435 | 7 | -603.242 | 1221.442 | 30.890 | 1.96e-7 |
| 3 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 41.386 | 1.03e-9 |

In contrast to the analyses of *M. myotis* data, here the best performing model contains all four explanatory variables (table 11). Additionally, this firstly ranked model possesses significantly higher explanatory power than the next-best model (deltaAIC = 30.890). Model averaging was therefore not necessary, since we have already obtained our best performing model with *R. hipposideros* data and the Adv15 GIS model. The current density values of the Adv15 GIS model do have a positive effect on bat activity. On the other side, distance to LCP seems to have a moderately negative impact on bat activity, while an estimate of the Lux-value of -15.829 suggests an extremely negative effect.

### ➢ GLMM 5: *R. hipposideros* data including the current_subavg GIS model

**Table 12: The three best performing models for *R. hipposideros* data with current density values of the GIS model Sumavg15.**

| rank | Subavg15 | Dist_ LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.322 | -0.761 | 0.418 | -15.826 | 8 | -589.689 | 1196.620 | 0.000 | 1.000 |
| 2 | 0.181 | -0.662 | - | -19.694 | 7 | -606.139 | 1227.235 | 30.615 | 2.25e-7 |
| 3 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 35.318 | 2.14e-8 |

Generalized linear mixed model analysis yielded a best performing model containing all variables of interest (table 12). With an estimate value of 0.322, the Subavg15 variable has a slightly positive influence on bat activity, while distance to LCP and the Lux-value have a strong negative influence on bat activity. The second best model has significant less explanatory power (deltaAIC = 30.615).

### ➢ GLMM 6: *R. hipposideros* data including the current_submax GIS model

**Table 13: The three best performing models for *R. hipposideros* data with current density values of the GIS model Submax15.**

| rank | Submax15 | Dist_ LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.163 | -0.854 | 0.301 | -17.816 | 8 | -602.754 | 1222.749 | 0.000 | 0.990 |
| 2 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 9.189 | 0.010 |
| 3 | 0.081 | -0.765 | - | -20.670 | 7 | -612.043 | 1239.043 | 16.294 | 2.86e-4 |

Table 13 lists the three best performing models for *R. hipposideros* data with the GIS model of Submax15 included in the analysis. The model ranking first keeps all four implemented variables in the model. The second best model has a deltaAIC of 9.189 and is therefore considerably less powerful than the first model. The Submax15 variable appears to have a slight positive effect on bat activity, whereas the Lux-value in this analysis has even a greater negative impact on bat activity than in the two previous analyses (-17.816).

Overall, if we compare the AICc-values of the three *M. myotis* analyses they show a very similar performance. In fact, the averaged AICc of all three approaches are within a deltaAIC $\leq$ 2 ($AICc_{Adv15}$ = 1719.084; $AICc_{Subavg15}$ = 1719.319; $AICc_{Submax15}$ = 1719.260). Hence, all three approaches have the same explanatory power. In contrast, AICc-values of *R. hipposideros* analyses are significantly different. Certainly, the model which includes the Adv15 GIS model (GLMM 4) performs better than the other two GIS models ($AICc_{Adv15}$ = 1190.552; $AICc_{Subavg15}$ = 1196.620; $AICc_{Submax15}$ = 1222.749). Consequently, the GIS model of "current_adv" is the most accurate for predicting *R. hipposideros* commuting corridors.

# DISCUSSION

Impact of artificial light on bat activity

Although we intended to sample equal dark and artificial lit sites, it was not possible to find the same amount of bright and dark places. Light conditions at some sampling sites were not as expected. Surprisingly, it occurred more often that a place expected to be illuminated was in fact dark, but rarely the other way around. It turned out, that five study sites only had very few light sources in the vicinity of the roost (Giswil, Buttisholz, Amsoldingen, Blumenstein, Surcasti), while at the site of Lipperswil the only road with street lights close by was under construction and all street lamps were powered off during recording. Hence, we sampled considerably more places with low Lux-values than higher ones. To distinguish between dark and lit places, a sensible threshold for a Lux-value had to be chosen, which we based on personal perception during light measurement on the one hand, and derived from prior studies on the other hand. Stone et al. (2012) demonstrated significantly reduced activities of *R. hipposideros* and *Myotis ssp*. during low light level of 3.6 lx, and Azam et al. (2018) ascertained that illuminance has a negative effect on *Myotis sp*., even below 1 lx. We lowered this limit once more and opted for a threshold of 0.5 lx. Despite this low chosen lux level, we resulted more dark than lit sites, which led to the fact that we could not simply compare bat passes of dark sites to sites where we measured higher Lux-values. Therefore, a generalized linear model analysis (*glm*) with 'Poisson' data distribution was conducted, based on the original unscaled data. This allows the detection of statistical significance of the tested variable, as well as to quantify the impact of the Lux variable on bat activity. The analysis revealed highly significant effects of artificial light on bat activity for both species. The estimate of the Lux variable of *M. myotis* indicates a decrease in bat activity of -0.2893. Thus, if the Lux-value increases by one unit (1 lx), bat activity decreases by almost one third. For *R. hipposideros* the estimate is -2.3514, which implies a reduction of bat activity of 235 % when illuminance increases by 1 lx. This is incredible when considering that a Luxmeter is very sensitive and 1 lx difference is reached easily by just standing approximately one meter closer to a light source or even turning the lux-meter slightly towards the light, allowing direct light beam onto the optical sensor. Yet, our results are consistent with the findings of several previous studies concerning negative impacts of artificial light on the commuting behaviour of bats (cf. Stone et al., 2009; Stone et al., 2012; Azam et al., 2018; Pauwels et al., 2019). Moreover, the calculated ratios of dark to lit places also indicate that *R. hipposideros* are probably more sensitive to light than *M. myotis*.

As a possible solution to this problem scientists have suggested installing street lights with dimming capacities (Stone et al., 2015; Azam et al. 2018). This approach was not examined

in this study. However, during measurement of Lux-values at sampling points we encountered dimmable street lamps at two sites and both were located within predicted commuting corridors. At sampling site 184 in Embrach we measured mean illuminance of 15.4 lx with full luminosity and approximately 10 lx when the light was dimmed. During commuting time, the road beneath this lamp was highly frequented. Thus, we incorporated the higher value in our analyses. We sampled 12 bat passes at this site. In Kallnach at site 117, the Lux-value was approximately 5 lx with full luminosity and 2.6 lx when dimmed. This road was rarely frequented, therefore we calculated with the lower measurement. Here, we recorded 3 bats passing. Surprisingly, we recorded higher bat activity at the brighter site in Embrach than at the more dimmed site in Kallnach. We explain this by the fact, that there were a lot of bushes around the street light in Embrach. Hence, the bats could probably move unaffected by the light in the shade of these bushes. Notwithstanding the above, we were amazed by the amount of reduced Lux-value when light is dimmed. Further research on artificial light with dimming capacity and its impact on bat activity is therefore suggested.

Finding the best performing model

Our statistical analysis method of choice was a generalized linear mixed model (GLMM), as it provides a flexible approach for analysing non-normal data when random effects have to be taken into account (Bolker et al. 2009). Our data was 'count' with 'Poisson' distribution, and we had four fixed effects of interest and three and five random effects, respectively. Consequently, we built one model with seven effects in total and another model with nine effects. Generally, the R-tool '*glmer'* can handle approximately ten to twelve variables without difficulties. By ranking and averaging the outputs, we gained one best performing model for each numeric GIS model and species. In all six analyses, the final best performing model contained all four examined explanatory variables.

The distance of a sampling point to its nearest Least Cost Path (Dist_LCP) correlated significantly negative with bat activity. Hence, the further away from a Least Cost Path we sample, the less likely it is to encounter commuting bats. GLMM 1 to 3 show that this variable has the biggest impact on *M. myotis* activity in our study. The average estimate values for all three analyses were almost equal (GLMM 1 = -0.417; GLMM 2 = -0.414; GLMM 3 = -0.415). Bat activity of *R. hipposideros* even stronger negatively correlates with the distance to a Least Cost Path (GLMM 4= -0.737; GLMM 5 = -0.761; GLMM 6 = -0.854). Least Cost Paths usually run along ecological structures on which bats are expected to depend for echolocation. The negative effect of the distance to a Least Cost Path for both species supports this assumption. Moreover, the stronger negative effect in *R. hipposideros* analyses confirms our presumption of the higher dependency of *R. hipposideros* on structures compared to *M. myotis*.

The separate analysis of the Lux variable, as discussed above, already revealed a significant negative effect of light on bat activity. Our results of the GLMM analyses confirm this. Estimate values for the Lux variable in *M. myotis* models are similarly high to the ones for Dist_LCP (cf. figure 7, 8 and 9). However, the negative estimates of the Lux variable in *R. hipposideros* analyses are much larger (GLMM 4 = -15.829; GLMM 5 = -15.826; GLMM 6 = -17.816). To test the credibility of these values, we reran the same analyses (GLMM 4 to 6) but dropped the Lux variable. The number one models in these analyses were identical with each 7$^{th}$ ranked model in the original analyses (see green rows in table 19, 20 and 21 in Appendix VI). Comparing the AICcs of these two models in each analysis, all models containing the Lux variable are significantly more powerful. It was decided to keep the Lux variable in all analyses and approve these high estimates.

The distance of a sampling point to the roost (Dist_Roost) seems to correlate negatively with *M. myotis* but has a positive effect on *R. hipposideros* activity. When consulting the tables 16 to 10 in Appendix VI, we see that the estimates of Dist_Roost in *M. myotis* analyses are always negative, whereas the ones for *R. hipposideros* analyses change randomly from negative to positive with decreasing power of the model (tables 19 to 21). We could neither think of a reasonable explanation for the opposite effect of this variable on the two species, nor the changing impact within *R. hipposideros* models. Consequently, we determined this variable as little informative for the *latter*. In any potential further analysis, the variable of distance to roost could be implemented as a random effect instead of as fixed.

Since the numeric corridor models for the two examined species were slightly different we evaluated them separately. Thereby, it is striking that within each averaged model for *M. myotis,* all three GIS model variables appear to have a slight negative effect on the response variable (table 8, 9, 10), while the estimates of the same variables are positive in each best ranked model for *R. hipposideros* (table 11, 12, 13). In fact, estimates of the GIS-model variables for *R. hipposideros* data are positive in all possible model combinations (see orange column in table 19, 20 and 21 in Appendix XI). Furthermore, the estimate values are sufficiently large so that possible variances should not cross the zero line. Hence, we approve the validity of these estimate values and suggest a positive correlation between the numeric GIS models and bat activity of *R. hipposideros*.

However, estimates of all three GIS-model variables for *M. myotis* data are less consistent. In analyses of Adv15 and Submax15, estimates of these variables in the upper eight models are negative, whereas in the lower eight models they become positive (table 16 and 18). Also, in the analysis where Subavg15 is incorporated, algebraic sign of its estimate changes randomly with decreasing power of the model (table 17). Therefore, this study can neither

state a positive nor a negative significant effect of the numeric corridor model on bat activity of *M. myotis*.

This contradicts the outcome of the simple comparison of bat activity in corridor vs. control sites. Selecting sampling points in ArcGIS with the corridor model overlaying an aerial photo was challenging and error-prone. On the map corridor sampling points seemed to lie within a corridor, but when extracting the current density value at the exact location where the Batlogger was recording, some sampling points generated only very small values. That is because high current density values occur only in the centre of a corridor and decrease with increasing distance to the centre. However, we installed the Batloggers approximately five meters beside a structure as explained in the chapter “Data collection – field work”. Therefore, some designated corridor sampling point actually had very small current density values. Since measured bat activity was higher at designated corridor sites, adaption of the corridor model concerning this shortage is recommended. Possibly the sharp decrease of current density values with increasing distance to the corridor centre could be reduced. In this way, predicted corridors were wider. This would take the longer detection range of *M. myotis* into account, which presumably fly along structures in some distance.

For the *M. myotis* analyses (GLMM 1 - 3), all three models result in the same AICc of 1719. Therefore, we conclude that all three GIS-model versions for *M. myotis* corridor prediction perform equally well. This was to be expected, as the correlation coefficient matrix already showed very high correlation (0.95 and 0.94) among the three different model versions (figure 11, Appendix IX). In *R. hipposideros* analyses (GLMM 4 - 6) occurred significant differences in the AICcs, which suggests the GIS-model version of “current_adv” to be the most accurate for predicting *R. hipposideros* commuting corridors.

Since both numeric corridor models greatly rest on structure ruggedness, terrain ruggedness and structures themselves, predicted corridors coincide largely with ecological structures such as trees, hedgerows, courses of streams and riparian vegetation. *R. hipposideros* have been reported to rely on such structures (Schofield, 1996; Motte & Libois, 2002), while *M. myotis* are assumed to be less dependent on them. This species’ specific ecological characteristic might explain why the numeric corridor model performs better for *R. hipposideros* than for *M. myotis*. This finding corresponds to our first impression we received when visually checking the recorded bat activity with the properties of its recording location. We observed a considerable number of *M. myotis* passes at control sites, e.g. far from predicted corridors, if they were unaffected by artificial light. On the opposite, we had sampling points located within corridors but lit, where we measured no activity at all. For *M. myotis,* we therefore assumed higher effect of light on bat activity than the presence of structures.

In all analyses, effects of the other three examined variables were higher than the impact of any predictive corridor model. To enhance the accuracy of the predictive corridor models further attempts to include light data into the numeric corridor models should be made. Incorporating ISS aerial photos was not successful due to insufficient resolution of data in rural areas and low correlation of the light values of the photos with Lux-values measured at the ground. A promising approach that emerged lately is to gather environmental measurement data and take aerial pictures by drones. Images of the surrounding of a roost taken at night could be calibrated like the ISS photos and be incorporated in the numeric corridor models. The insufficiencies of the ISS images should be overcome by this approach.

# CONCLUSION

In this study we demonstrated highly significant negative effects of artificial light on commuting bat activity for both species examined, Greater mouse-eared bat and Lesser horseshoe bat. The comparison of the ratio of bat activity at dark and lit sites suggests that *R. hipposideros* is more sensitive to light than *M. myotis*. In addition, the distance of a sampling point to its nearest Least Cost Path correlated significantly with bat activity. However, reliability of the predictive corridor models could not be proven satisfyingly. For *M. myotis,* there was no significant effect of the commuting corridor model on bat activity. The *R. hipposideros* model including the numeric corridor model of "current_adv" performed best and showed positive correlation with measured bat activity. For any further efforts to enhance the predictive corridor model, we suggest to focus on the most recent version of Circuitscape 'advanced'. In all analyses, the other three variables examined ('distance to LCP', 'distance to roost', 'Lux-value') showed higher effect on bat activity than the predictive corridor models, in particular the variable of light. Further adaption of the predictive corridor models should therefore concentrate on the inclusion of the light variable. This can be accomplished for example, by gathering comprehensive light data by taking pictures at night with drones. This is a promising approach and should be pursued.

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# APPENDIX

# Appendix I

**Table 14: Full data table**

| site-ID | Community | x-Koord | y-Koord | Bat-logger | Recording Date | Species | Bat Activity | Distance site to roost [m] | Roost size [individuals] | Lux1 | Lux2 | Lux3 | Lux4 | Lux5 | Lux_mean | light | corridor | Corridor value current_adv 5 | Corridor value current_adv 15 | Corridor value current_subavg 5 | Corridor value current_subavg 15 | Corridor value current_submax 5 | Corridor value current_submax 15 | Distance Site to LCP [m] | Weather Station | Distance Stat. to Roost [km] | Temperature [°C] | Humidity [%] | Precipi-tation [mm] | Wind speed [m/s] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| site-ID | Comm | | | BL | Rec_Date | | Activity | Dist_Roost | R_size | | | | | | Lux | Light | Corridor | Adv5 | Adv15 | Subavg5 | Subavg15 | Submax5 | Submax15 | Dist_LCP | | | Temp | Humi | Prec | Wind | Variable name for GLMM |
| 116 | Kallnach | 584652 | 207463 | 1061 | 09.07.2019 | M.m. | 20 | 61 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.130979 | 0.125369 | 0.037107 | 0.027962 | 0.038701 | 0.029265 | 31.8 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 117 | Kallnach | 584783 | 207563 | 1053 | 09.07.2019 | M.m. | 3 | 211 | 411 | 2 | 2 | 2 | 2 | 5 | 2.6 | yes | yes | 0.027690699 | 0.027690699 | 0.00666552 | 0.00666552 | 0.00742969 | 0.00742969 | 26.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | Dimable street lamp (5 lx when traffic, 2 lx without traffic) |
| 118 | Kallnach | 584904 | 207860 | 1048 | 09.07.2019 | M.m. | 4 | 497 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0142223 | 0.0142223 | 0.00382911 | 0.00382911 | 0.00464098 | 0.00464098 | 121.1 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 119 | Kallnach | 584703 | 207524 | 1029 | 09.07.2019 | M.m. | 4 | 122 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.045030199 | 0.045030199 | 0.0118896 | 0.0118896 | 0.0127709 | 0.0127709 | 20.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 120 | Kallnach | 584559 | 207378 | 1057 | 09.07.2019 | M.m. | NA | 101 | 411 | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 0.6 | yes | no | 0.024319001 | 0.024319001 | 0.00570728 | 0.00570728 | 0.00682226 | 0.00682226 | 28.9 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | NoData -> microphone possibly damaged (open) |
| 121 | Kallnach | 584474 | 207454 | 1037 | 09.07.2019 | M.m. | 0 | 120 | 411 | 7 | 8 | 7 | 5 | 6 | 6.6 | yes | no | 0.0176121 | 0.0176121 | 0.00441713 | 0.00441713 | 0.0059535 | 0.0059535 | 71.4 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 122 | Kallnach | 584579 | 207522 | 1032 | 09.07.2019 | M.m. | 0 | 51 | 411 | 1 | 1 | 1 | 0.5 | 1 | 0.9 | yes | yes | 0.0607704 | 0.0607704 | 0.0153597 | 0.0153597 | 0.016778201 | 0.016778201 | 48.1 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 123 | Kallnach | 584526 | 207284 | 1075 | 09.07.2019 | M.m. | 12 | 200 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | yes | no | 0.0110964 | 0.0110964 | 0.00262088 | 0.00262088 | 0.00341375 | 0.00341375 | 68.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 124 | Kallnach | 584529 | 207078 | 1073 | 09.07.2019 | M.m. | 65 | 400 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0159657 | 0.0159657 | 0.00398686 | 0.00398686 | 0.00559038 | 0.00559038 | 20.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 125 | Kallnach | 584565 | 207152 | 1031 | 09.07.2019 | M.m. | 31 | 322 | 411 | 0.5 | 0 | 0 | 0 | 0.5 | 0.2 | yes | yes | 0.021523301 | 0.021523301 | 0.00506903 | 0.00506903 | 0.00718839 | 0.00718839 | 0.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 126 | Kallnach | 584765 | 207406 | 1063 | 09.07.2019 | M.m. | 22 | 186 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0241218 | 0.0241218 | 0.00598213 | 0.00598213 | 0.00638468 | 0.00638468 | 149.2 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 127 | Kallnach | 585044 | 207418 | 1074 | 09.07.2019 | M.m. | 3 | 455 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00489142 | 0.00489142 | 0.0014938 | 0.0014938 | 0.00171673 | 0.00171673 | 302.1 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 128 | Kallnach | 584731 | 207321 | 1056 | 09.07.2019 | M.m. | 1 | 206 | 411 | 0.5 | 0 | 0 | 0 | 0 | 0.1 | no | no | 0.0112099 | 0.0112099 | 0.00262128 | 0.00262128 | 0.003511 | 0.003511 | 136.7 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 129 | Kallnach | 584383 | 207446 | 3314 | 09.07.2019 | M.m. | 2 | 211 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0100002 | 0.0100002 | 0.00230017 | 0.00230017 | 0.00341776 | 0.00341776 | 111.9 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 130 | Kallnach | 584493 | 207643 | 1249 | 09.07.2019 | M.m. | 18 | 197 | 411 | 1 | 0 | 0.5 | 0.5 | 1 | 0.6 | yes | no | 0.0149779 | 0.0149779 | 0.00393202 | 0.00393202 | 0.00521801 | 0.00521801 | 103.5 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 131 | Kallnach | 584300 | 207759 | 1036 | 09.07.2019 | M.m. | 2 | 409 | 411 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00472915 | 0.00472915 | 0.00130418 | 0.00130418 | 0.00324199 | 0.00324199 | 112.4 | Mühleberg | 5.9 | 16.1 | 70.6 | 0 | 1.1 | |
| 132 | Därstetten | 604201 | 167465 | 1037 | 01.06.2019 | R.h. | 2 | 65 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.0610594 | 0.061362401 | 0.0152393 | 0.0153139 | 0.0155674 | 0.015645299 | 7.8 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 133 | Därstetten | 604116 | 167606 | 1249 | 01.06.2019 | R.h. | 0 | 113 | 110 | 0 | 0.5 | 0 | 0 | 0 | 0.1 | yes | yes | 0.058584198 | 0.052783899 | 0.0145966 | 0.013151 | 0.0151203 | 0.0136328 | 113.2 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 134 | Därstetten | 604373 | 167465 | 1036 | 01.06.2019 | R.h. | 0 | 185 | 110 | 2 | 3 | 2 | 1 | 30 | 7.6 | yes | no | 0.0136542 | 0.0122777 | 0.00341461 | 0.00306948 | 0.00357669 | 0.00319935 | 127.5 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 135 | Därstetten | 604119 | 167537 | 1074 | 01.06.2019 | R.h. | 0 | 81 | 110 | 0 | 1 | 1 | 0 | 0 | 0.4 | no | no | 0.0461585 | 0.0475673 | 0.0116346 | 0.0120337 | 0.0120736 | 0.0126002 | 79.1 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 136 | Därstetten | 604213 | 167403 | 1031 | 01.06.2019 | R.h. | 3 | 128 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.103514999 | 0.100339003 | 0.026148099 | 0.025335699 | 0.0280184 | 0.0271322 | 5.5 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 137 | Därstetten | 604330 | 167803 | 1057 | 01.06.2019 | R.h. | 2 | 302 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00569192 | 0.00737677 | 0.00150186 | 0.0019476 | 0.001526 | 0.00197788 | 305.7 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 138 | Därstetten | 604075 | 167651 | 1063 | 01.06.2019 | R.h. | 2 | 174 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.031519599 | 0.032044601 | 0.00782876 | 0.00795922 | 0.00857555 | 0.00871799 | 173.9 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 139 | Därstetten | 604388 | 167626 | 1073 | 01.06.2019 | R.h. | 0 | 211 | 110 | 0 | 0.5 | 0 | 0 | 0.5 | 0.2 | no | no | 0.00921198 | 0.00953682 | 0.00228078 | 0.00236432 | 0.00254994 | 0.00263549 | 214.5 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 140 | Därstetten | 604566 | 167278 | 1048 | 01.06.2019 | R.h. | 10 | 444 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.0262377 | 0.0358398 | 0.00666542 | 0.00911045 | 0.00731872 | 0.0100012 | 20.5 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 141 | Därstetten | 604278 | 167393 | 1053 | 01.06.2019 | R.h. | 0 | 158 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | yes | no | 0.0157042 | 0.015992099 | 0.00394368 | 0.00401599 | 0.004202 | 0.00427812 | 66.3 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 142 | Därstetten | 603998 | 167445 | 3314 | 01.06.2019 | R.h. | 2 | 219 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00845661 | 0.00823013 | 0.0020226 | 0.00197284 | 0.00242145 | 0.00235754 | 179.5 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 143 | Därstetten | 604421 | 167362 | 1029 | 01.06.2019 | R.h. | NA | 278 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00381319 | 0.027375899 | 0.000977351 | 0.00695743 | 0.00143562 | 0.00783998 | 24.7 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | NoData -> BL shut down |
| 144 | Därstetten | 604280 | 167586 | 1075 | 01.06.2019 | R.h. | 0 | 98 | 110 | 0 | 0.5 | 0.5 | 0.5 | 0 | 0.3 | yes | no | 0.023440201 | 0.0230226 | 0.00583221 | 0.00574008 | 0.006013 | 0.00591883 | 101.1 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 145 | Därstetten | 604636 | 167691 | 1032 | 01.06.2019 | R.h. | 4 | 465 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000459346 | 0.00057242 | 0.000112593 | 0.000140318 | 0.00014723 | 0.00018331 | 409.8 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 146 | Därstetten | 603780 | 167647 | 1056 | 01.06.2019 | R.h. | 0 | 436 | 110 | 81 | 30 | 40 | 32 | 31 | 42.8 | yes | no | 0.00151535 | 0.00169426 | 0.000384319 | 0.000434222 | 0.000462994 | 0.000511379 | 434.3 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 147 | Därstetten | 604492 | 166996 | 1061 | 01.06.2019 | R.h. | 3 | 609 | 110 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.116623998 | 0.078406103 | 0.00972363 | 0.014604 | 0.019447301 | 0.021526299 | 1.6 | Boltigen | 9.3 | 11.6 | 90.6 | 0 | 0.9 | |
| 148 | Amsoldingen | 610714 | 175181 | 3314 | 31.05.2019 | R.h. | 1 | 53 | 60 | 1 | 1 | 1 | 1 | 1 | 1 | yes | yes | 0.139109999 | 0.105435997 | 0.035592198 | 0.0270366 | 0.036140699 | 0.0274218 | 46.7 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 149 | Amsoldingen | 610717 | 175091 | 1031 | 31.05.2019 | R.h. | 2 | 61 | 60 | 0.5 | 0.5 | 0 | 0 | 0 | 0.2 | yes | yes | 0.058017202 | 0.059165299 | 0.0146624 | 0.0149551 | 0.0147122 | 0.0150056 | 27.1 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 150 | Amsoldingen | 610149 | 175364 | 1057 | 31.05.2019 | R.h. | 3 | 576 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.020013001 | 0.071045399 | 0.00481491 | 0.0169021 | 0.00532244 | 0.018623 | 577.7 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 151 | Amsoldingen | 610753 | 175226 | 1061 | 31.05.2019 | R.h. | 4 | 113 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0363678 | 0.0459309 | 0.00937679 | 0.0118416 | 0.00959786 | 0.01212 | 106.1 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 152 | Amsoldingen | 610846 | 174979 | 1074 | 31.05.2019 | R.h. | 0 | 231 | 60 | 1 | 2 | 4 | 1 | 0.5 | 1.7 | yes | no | 0.0303808 | 0.0275394 | 0.00782947 | 0.00709946 | 0.00790716 | 0.00717114 | 131.6 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 153 | Amsoldingen | 610535 | 175297 | 1048 | 31.05.2019 | R.h. | 0 | 214 | 60 | 7 | 16 | 3 | 3 | 19 | 9.6 | no | no | 0.00873041 | 0.0112606 | 0.00212568 | 0.002764 | 0.00216586 | 0.00282507 | 213.6 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 154 | Amsoldingen | 610846 | 175248 | 1037 | 31.05.2019 | R.h. | 14 | 198 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.018985299 | 0.0186636 | 0.00495064 | 0.00486642 | 0.00510182 | 0.00501464 | 100.4 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 155 | Amsoldingen | 610230 | 175331 | 1032 | 31.05.2019 | R.h. | 0 | 489 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00907608 | 0.016052401 | 0.00235312 | 0.0039732 | 0.00268148 | 0.00432614 | 490.2 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 156 | Amsoldingen | 611030 | 175231 | 1056 | 31.05.2019 | R.h. | 3 | 362 | 60 | 0 | 0 | 0.5 | 0 | 0 | 0.1 | yes | no | 0.0222342 | 0.0170357 | 0.00590056 | 0.00452143 | 0.0061611 | 0.00472185 | 3.5 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 157 | Amsoldingen | 610887 | 174823 | 1063 | 31.05.2019 | R.h. | 0 | 379 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00508341 | 0.00486129 | 0.00139345 | 0.00130662 | 0.00144126 | 0.00135089 | 292.9 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 158 | Amsoldingen | 610807 | 174842 | 1053 | 31.05.2019 | R.h. | 1 | 324 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00056276 | 0.000647388 | 0.000155869 | 0.000177934 | 0.000189512 | 0.00023615 | 265.5 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 159 | Amsoldingen | 610263 | 174728 | 1249 | 31.05.2019 | R.h. | 0 | 586 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00534097 | 0.00462687 | 0.00110195 | 0.000952833 | 0.00150163 | 0.00129813 | 589.7 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 160 | Amsoldingen | 610116 | 175408 | 1073 | 31.05.2019 | R.h. | 9 | 624 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0198991 | 0.025006199 | 0.00473165 | 0.0059408 | 0.00520761 | 0.00653712 | 625.6 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 161 | Amsoldingen | 610361 | 175406 | 1029 | 31.05.2019 | R.h. | 0 | 415 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00375943 | 0.00384549 | 0.000936143 | 0.000957209 | 0.000971454 | 0.0010042 | 415.7 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 162 | Amsoldingen | 611167 | 175269 | 1075 | 31.05.2019 | R.h. | 2 | 504 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | yes | no | 0.00596052 | 0.00861773 | 0.00159793 | 0.00230875 | 0.00169225 | 0.00244128 | 35.5 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 163 | Amsoldingen | 610574 | 175476 | 1036 | 31.05.2019 | R.h. | 0 | 352 | 60 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00798858 | 0.00791675 | 0.00207837 | 0.00203282 | 0.00218368 | 0.00212065 | 350.7 | Thun | 2.6 | 13.3 | 77.8 | 0 | 0.9 | |
| 164 | Blumenstein | 605789 | 174959 | 1063 | 30.05.2019 | R.h. | 49 | 49 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.100708999 | 0.101268001 | 0.0251281 | 0.02527 | 0.0251434 | 0.0252846 | 33.2 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 165 | Blumenstein | 605682 | 174946 | 3314 | 30.05.2019 | R.h. | 1 | 61 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0841645 | 0.071147501 | 0.0210681 | 0.0178145 | 0.0210784 | 0.0178234 | 61.8 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 166 | Blumenstein | 605731 | 174879 | 1032 | 30.05.2019 | R.h. | 0 | 87 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.051386099 | 0.062107801 | 0.0128816 | 0.0155664 | 0.0129258 | 0.0156249 | 33.2 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 167 | Blumenstein | 605772 | 174926 | 1031 | 30.05.2019 | R.h. | 3 | 51 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.143635005 | 0.136333004 | 0.036039598 | 0.034213699 | 0.0360796 | 0.034256201 | 2.1 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 168 | Blumenstein | 605868 | 175120 | 1074 | 30.05.2019 | R.h. | 0 | 200 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0053619 | 0.00581227 | 0.00133864 | 0.0014509 | 0.00134091 | 0.00145339 | 200.6 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 169 | Blumenstein | 605639 | 175094 | 1053 | 30.05.2019 | R.h. | 1 | 163 | 200 | 1 | 0.5 | 1 | 0 | 2 | 0.9 | no | no | 0.0112395 | 0.0117931 | 0.00277948 | 0.0029147 | 0.00278291 | 0.0029183 | 166.6 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 170 | Blumenstein | 605512 | 174928 | 1073 | 30.05.2019 | R.h. | 0 | 231 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000670548 | 0.000671873 | 0.000168135 | 0.000168467 | 0.000169276 | 0.000169611 | 124.5 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 171 | Blumenstein | 605734 | 175043 | 1056 | 30.05.2019 | R.h. | 0 | 77 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.025009301 | 0.0240421 | 0.00620382 | 0.00596558 | 0.00620898 | 0.00597026 | 80.0 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 172 | Blumenstein | 605730 | 175147 | 1061 | 30.05.2019 | R.h. | 0 | 181 | 200 | 1 | 0 | 1 | 2 | 1 | 1 | no | no | 0.00540508 | 0.00542453 | 0.00132766 | 0.00133458 | 0.0013297 | 0.0013365 | 183.9 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 173 | Blumenstein | 605674 | 174976 | 1249 | 30.05.2019 | R.h. | 8 | 67 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.047147501 | 0.044379801 | 0.0117621 | 0.0110707 | 0.011769 | 0.0110771 | 69.6 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 174 | Blumenstein | 605683 | 175039 | 1075 | 30.05.2019 | R.h. | 3 | 93 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.019080799 | 0.0194376 | 0.00473745 | 0.0048264 | 0.00474177 | 0.00483077 | 96.1 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 175 | Blumenstein | 605706 | 174988 | 1037 | 30.05.2019 | R.h. | 7 | 40 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.081847899 | 0.079162396 | 0.020342 | 0.0196731 | 0.0203529 | 0.0196837 | 44.0 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 176 | Blumenstein | 605680 | 174863 | 1057 | 30.05.2019 | R.h. | 0 | 119 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00646894 | 0.00622146 | 0.00161783 | 0.00155582 | 0.00162776 | 0.00156566 | 68.6 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 177 | Blumenstein | 605827 | 175033 | 1029 | 30.05.2019 | R.h. | 0 | 110 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.018536299 | 0.0189995 | 0.00460794 | 0.00472345 | 0.00461717 | 0.00473272 | 109.4 | Thun | 6.1 | 8.9 | 82.1 | 0 | 0.7 | |
| 178 | Blumenstein | NA | NA | | | | NA | | | | | | | | | | | | | | | | | | | | 8.9 | 82.1 | 0 | 0.7 | |
| 179 | Blumenstein | NA | NA | | | | NA | | | | | | | | | | | | | | | | | | | | 8.9 | 82.1 | 0 | 0.7 | |
| 180 | Embrach | 687206 | 261823 | 1073 | 17.07.2019 | M.m. | 27 | 61 | 298 | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 0.6 | no | yes | 0.058149301 | 0.184590995 | 0.0150071 | 0.046457201 | 0.0161207 | 0.048870001 | 5.7 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 181 | Embrach | 687165 | 261732 | 1037 | 17.07.2019 | M.m. | 1 | 70 | 298 | 1 | 5 | 13 | 1 | 1 | 4.2 | yes | yes | 0.058679398 | 0.054562598 | 0.0147983 | 0.0137558 | 0.0150457 | 0.013986 | 65.5 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 182 | Embrach | 687185 | 261669 | 1053 | 17.07.2019 | M.m. | 7 | 136 | 298 | 1 | 0.5 | 1 | 1 | 0 | 0.7 | yes | yes | 0.235576004 | 0.022992499 | 0.0594781 | 0.00606201 | 0.061326299 | 0.0073242 | 128.5 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 183 | Embrach | 686965 | 262151 | 1056 | 17.07.2019 | M.m. | 1 | 397 | 298 | 0 | 0 | 0.5 | 0.5 | 0 | 0.2 | no | yes | 0.0116323 | 0.0163895 | 0.00294769 | 0.00408229 | 0.00309796 | 0.00432129 | 2.9 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 184 | Embrach | 687270 | 261854 | 1249 | 17.07.2019 | M.m. | 12 | 132 | 298 | 16 | 32 | 15 | 7 | 7 | 15.4 | yes | yes | 0.179600999 | 0.139813006 | 0.044874702 | 0.0349393 | 0.0478625 | 0.037262201 | 2.5 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | Dimable street lamp |
| 185 | Embrach | 686980 | 261767 | 1057 | 17.07.2019 | M.m. | 4 | 173 | 298 | 3 | 4 | 5 | 3 | 2 | 3.4 | yes | yes | 0.0554705 | 0.040966101 | 0.0134787 | 0.00994195 | 0.015335 | 0.0113258 | 175.2 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 186 | Embrach | 686984 | 261972 | 1063 | 17.07.2019 | M.m. | 3 | 239 | 298 | 1 | 0 | 0 | 1 | 0.5 | 0.5 | no | yes | 0.094967298 | 0.071259603 | 0.0234251 | 0.0175818 | 0.024746301 | 0.018607199 | 25.7 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 187 | Embrach | 687189 | 261997 | 1075 | 17.07.2019 | M.m. | 0 | 201 | 298 | 0 | 0 | 0 | 0.5 | 0.5 | 0.2 | no | yes | 0.0142731 | 0.016572 | 0.00349355 | 0.00410471 | 0.00389818 | 0.00454519 | 17.1 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 188 | Embrach | 687258 | 261413 | 1048 | 17.07.2019 | M.m. | 14 | 402 | 298 | 0 | 0 | 1 | 0 | 0 | 0.2 | no | no | 0.0101399 | 0.00959102 | 0.00282424 | 0.00266116 | 0.00323758 | 0.00304776 | 380.0 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 189 | Embrach | 686812 | 261625 | 1061 | 17.07.2019 | M.m. | 8 | 381 | 298 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00790154 | 0.00799528 | 0.00185549 | 0.00187756 | 0.00231379 | 0.00234117 | 381.7 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 190 | Embrach | 686875 | 261953 | 3314 | 17.07.2019 | M.m. | 0 | 315 | 298 | 7 | 7 | 5 | 10 | 19 | 9.6 | yes | no | 0.00987815 | 0.0312146 | 0.00235187 | 0.00768554 | 0.00282682 | 0.00837566 | 118.3 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 191 | Embrach | 687279 | 262056 | 1031 | 17.07.2019 | M.m. | 2 | 287 | 298 | 3 | 13 | 2 | 1 | 5 | 4.8 | no | no | 0.00526866 | 0.00530425 | 0.00137856 | 0.00138692 | 0.00151097 | 0.00150377 | 99.9 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 192 | Embrach | 687582 | 261893 | 1074 | 17.07.2019 | M.m. | 0 | 442 | 298 | 6 | 5 | 7 | 8 | 4 | 6 | yes | no | 0.00680838 | 0.0068338 | 0.00183733 | 0.0018441 | 0.00248981 | 0.00249897 | 24.5 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 193 | Embrach | 687028 | 261596 | 1036 | 17.07.2019 | M.m. | 0 | 238 | 298 | 1 | 1 | 0.5 | 1 | 3 | 1.3 | yes | no | 0.00983389 | 0.00990283 | 0.00234009 | 0.00237037 | 0.00293923 | 0.00295041 | 236.9 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 194 | Embrach | 687398 | 261711 | 1032 | 17.07.2019 | M.m. | 4 | 263 | 298 | 2 | 3 | 2 | 2 | 5 | 2.8 | yes | no | 0.00886622 | 0.00875544 | 0.0023448 | 0.00231568 | 0.00282245 | 0.00278963 | 128.7 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |
| 195 | Embrach | 687461 | 262036 | 1029 | 17.07.2019 | M.m. | 0 | 390 | 298 | 0.5 | 1 | 1 | 0 | 0 | 0.5 | no | no | 0.0078436 | 0.015382 | 0.0021028 | 0.00398736 | 0.0028478 | 0.00464198 | 135.0 | Zürich/Kloten | 5.1 | 16.5 | 63.8 | 0 | 0.8 | |

| site-ID | Community | x-Koord | y-Koord | Bat-logger | Recording Date | Species | Bat Activity | Distance site to roost [m] | Roost size [individuals] | Lux1 | Lux2 | Lux3 | Lux4 | Lux5 | Lux_mean | light | corridor | Corridor value current_adv 5 | Corridor value current_adv 15 | Corridor value current_subavg 5 | Corridor value current_subavg 15 | Corridor value current_submax 5 | Corridor value current_submax 15 | Distance Site to LCP [m] | Weather Station | Distance Stat. to Roost [km] | Temperature [°C] | Humidity [%] | Precipi-tation [mm] | Wind speed [m/s] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 196 | Mühlau | 672167 | 231500 | 1063 | 06.06.2019 | M.m. | 43 | 127 | 528 | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.3 | no | no | 0.0166193 | 0.017163699 | 0.00386093 | 0.00398803 | 0.00723367 | 0.00746341 | 130.5 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 197 | Mühlau | 672633 | 231699 | 1057 | 06.06.2019 | M.m. | 2 | 634 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000458323 | 0.0303319 | 0.000160866 | 0.00698794 | 0.000884114 | 0.042731799 | 18.5 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 198 | Mühlau | 672023 | 231378 | 1075 | 06.06.2019 | M.m. | 2 | 77 | 528 | 5 | 7 | 6 | 2 | 2 | 4.4 | yes | yes | 0.081456497 | 0.079772301 | 0.020881001 | 0.0204744 | 0.0226155 | 0.022235099 | 9.9 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 199 | Mühlau | 671598 | 230948 | 1031 | 06.06.2019 | M.m. | 0 | 676 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.188334003 | 0.152246997 | 0.051714201 | 0.041834202 | 0.086502798 | 0.0699986 | 16.1 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 200 | Mühlau | 671953 | 231380 | 1029 | 06.06.2019 | M.m. | 3 | 120 | 528 | 4.5 | 4 | 2 | 6 | 9 | 5.1 | yes | yes | 0.002661 | 0.170708001 | 0.000728098 | 0.0448539 | 0.000889356 | 0.052359998 | 2.5 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 201 | Mühlau | 671743 | 231242 | 1249 | 06.06.2019 | M.m. | 4 | 371 | 528 | 0 | 0 | 0 | 0.5 | 0 | 0.1 | no | yes | 0.000192047 | 0.000192498 | 0.000333307 | 0.000337197 | 0.000515894 | 0.000519439 | 32.5 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 202 | Mühlau | 672246 | 231440 | 1048 | 06.06.2019 | M.m. | 9 | 196 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00929148 | 0.00926916 | 0.00208905 | 0.0020826 | 0.0054245 | 0.0053708 | 191.6 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 203 | Mühlau | 672425 | 231391 | 1032 | 06.06.2019 | M.m. | 3 | 380 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0143341 | 0.0134049 | 0.00291333 | 0.00281614 | 0.0123048 | 0.012058 | 39.6 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 204 | Mühlau | 671584 | 231322 | 1056 | 06.06.2019 | M.m. | 0 | 483 | 528 | 1 | 0 | 1 | 3 | 2 | 1.4 | no | no | 0.0140241 | 0.0142115 | 0.00368747 | 0.00373686 | 0.00617414 | 0.00625711 | 9.2 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 205 | Mühlau | 671827 | 231688 | 1053 | 06.06.2019 | M.m. | 3 | 326 | 528 | 0.5 | 0 | 0.5 | 0.5 | 0 | 0.3 | yes | no | 0.00940815 | 0.00941278 | 0.00261578 | 0.00261795 | 0.00367432 | 0.00367395 | 325.6 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 206 | Mühlau | 672044 | 231254 | 1061 | 06.06.2019 | M.m. | 0 | 196 | 528 | 1 | 1 | 2.5 | 1 | 1 | 1.3 | yes | no | 0.00662337 | 0.00675595 | 0.00242038 | 0.00241196 | 0.00269656 | 0.00275888 | 82.7 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 207 | Mühlau | 672128 | 231627 | 1036 | 06.06.2019 | M.m. | 0 | 193 | 528 | 1 | 1 | 1 | 1 | 1 | 1 | yes | no | 0.00638761 | 0.00644444 | 0.00195553 | 0.00198163 | 0.0043942 | 0.00442238 | 196.7 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 208 | Mühlau | 671894 | 231588 | 1037 | 06.06.2019 | M.m. | 0 | 208 | 528 | 3 | 1 | 5 | 3 | 2 | 2.8 | yes | no | 0.00801336 | 0.00804077 | 0.00226457 | 0.00227328 | 0.00279001 | 0.00279753 | 208.1 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 209 | Mühlau | 672538 | 231611 | 1073 | 06.06.2019 | M.m. | 1 | 514 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.00273104 | 0.00276431 | 0.000621711 | 0.000629217 | 0.00193297 | 0.00195649 | 37.7 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 210 | Mühlau | 671856 | 231350 | 1074 | 06.06.2019 | M.m. | 5 | 218 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | yes | yes | 0.277741998 | 0.216479003 | 0.0736138 | 0.057359599 | 0.0892803 | 0.069886804 | 2.5 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 211 | Mühlau | 671413 | 231754 | 3314 | 06.06.2019 | M.m. | 1 | 706 | 528 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 1.82413E-05 | 0.0066316 | 4.94641E-06 | 0.00182751 | 8.16858E-06 | 0.00294284 | 372.6 | Cham | 7.3 | 10.9 | 85.3 | 0 | 2.1 | |
| 212 | Wegenstetten | 637381 | 260960 | 1029 | 16.07.2019 | M.m. | 7 | 57 | 200 | 1 | 1 | 2 | 3 | 1 | 1.6 | yes | yes | 0.351514012 | 0.329396009 | 0.137303993 | 0.106339999 | 0.137786001 | 0.107392997 | 0.5 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 213 | Wegenstetten | 637292 | 260894 | 1249 | 16.07.2019 | M.m. | 2 | 168 | 200 | 1 | 1 | 1 | 1 | 1 | 1 | yes | yes | 0.047515102 | 0.048588298 | 0.0107804 | 0.0111167 | 0.0109777 | 0.0113188 | 60.5 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 214 | Wegenstetten | 637495 | 260594 | 1061 | 16.07.2019 | M.m. | 43 | 406 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.172597006 | 0.078547403 | 0.0405683 | 0.018469799 | 0.065358803 | 0.029682601 | 0.5 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 215 | Wegenstetten | 637393 | 260780 | 1048 | 16.07.2019 | M.m. | 64 | 217 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0163367 | 0.0171795 | 0.00390026 | 0.00409938 | 0.00553246 | 0.00583346 | 14.1 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 216 | Wegenstetten | 637155 | 261083 | 1031 | 16.07.2019 | M.m. | 0 | 286 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.041475099 | 0.039152499 | 0.0103006 | 0.00981641 | 0.0134179 | 0.0127826 | 0.0 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 217 | Wegenstetten | 637150 | 261341 | 1063 | 16.07.2019 | M.m. | 3 | 444 | 200 | 1 | 1 | 1 | 1 | 1 | 1 | yes | yes | 0.101496004 | 0.187606007 | 0.029035 | 0.053853501 | 0.0440052 | 0.082684398 | 1.4 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 218 | Wegenstetten | 637213 | 261428 | 1036 | 16.07.2019 | M.m. | 1 | 484 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00725878 | 0.00738412 | 0.00231145 | 0.00235568 | 0.00343853 | 0.00350594 | 16.3 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 219 | Wegenstetten | 637538 | 261132 | 1032 | 16.07.2019 | M.m. | 2 | 177 | 200 | 1 | 0 | 1 | 2 | 5 | 1.8 | yes | yes | 0.0172826 | 0.016543699 | 0.00436416 | 0.00420356 | 0.00483657 | 0.00476211 | 182.8 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 220 | Wegenstetten | 637414 | 261091 | 1037 | 16.07.2019 | M.m. | 0 | 98 | 200 | 9 | 4 | 4 | 12 | 23 | 10.4 | yes | no | 0.0226241 | 0.0224723 | 0.00579161 | 0.0057532 | 0.00636738 | 0.00632677 | 101.9 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 221 | Wegenstetten | 637504 | 260980 | 3314 | 16.07.2019 | M.m. | 3 | 78 | 200 | 0 | 0 | 0.5 | 0 | 0 | 0.1 | no | no | 0.0249616 | 0.025005201 | 0.00606855 | 0.00607912 | 0.00698333 | 0.00699578 | 81.1 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 222 | Wegenstetten | 637191 | 260786 | 1075 | 16.07.2019 | M.m. | 0 | 315 | 200 | 2 | 1 | 2 | 5 | 3 | 2.6 | yes | no | 0.0114936 | 0.0113039 | 0.00266906 | 0.00272038 | 0.00307128 | 0.0031542 | 168.0 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 223 | Wegenstetten | 637752 | 261208 | 1073 | 16.07.2019 | M.m. | 0 | 389 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0038993 | 0.00386967 | 0.00105668 | 0.00105005 | 0.0015175 | 0.00150534 | 394.5 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 224 | Wegenstetten | 637554 | 260821 | 1074 | 16.07.2019 | M.m. | 4 | 215 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00897264 | 0.00886841 | 0.00215184 | 0.00212959 | 0.0030343 | 0.002996 | 171.6 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 225 | Wegenstetten | 637614 | 261007 | 1057 | 16.07.2019 | M.m. | 4 | 187 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00984233 | 0.00980043 | 0.00235355 | 0.00234593 | 0.00301771 | 0.00300992 | 191.3 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 226 | Wegenstetten | 637050 | 260869 | 1056 | 16.07.2019 | M.m. | 1 | 397 | 200 | 3 | 1 | 0 | 7 | 1 | 2.4 | yes | no | 0.00629796 | 0.00627529 | 0.00191636 | 0.00192633 | 0.00230582 | 0.00230048 | 207.9 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 227 | Wegenstetten | 637354 | 261206 | 1053 | 16.07.2019 | M.m. | 1 | 224 | 200 | 1 | 1 | 1 | 1 | 2 | 1.2 | yes | no | 0.016218601 | 0.016514299 | 0.00428313 | 0.00436219 | 0.00510822 | 0.00520585 | 176.2 | Rünenberg | 8.3 | 18.8 | 51.1 | 0 | 0.6 | |
| 228 | Buttisholz | 650164 | 216902 | 1053 | 05.07.2019 | M.m. | 55 | 50 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.054822698 | 0.055429999 | 0.0131997 | 0.0133399 | 0.0131997 | 0.0133399 | 49.5 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 229 | Buttisholz | 650223 | 216998 | 1031 | 05.07.2019 | M.m. | 24 | 87 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.057004198 | 0.0576705 | 0.0152597 | 0.0154742 | 0.0152597 | 0.0154742 | 17.5 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 230 | Buttisholz | 650140 | 326793 | 1074 | 05.07.2019 | M.m. | 9 | 157 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0240294 | 0.0229422 | 0.00427941 | 0.00433269 | 0.00427941 | 0.00433269 | 162.1 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 231 | Buttisholz | 650122 | 216834 | 1057 | 05.07.2019 | M.m. | 16 | 119 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.025428399 | 0.0325955 | 0.00527138 | 0.00685923 | 0.00527138 | 0.00685923 | 117.1 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 232 | Buttisholz | 650354 | 217192 | 1061 | 05.07.2019 | M.m. | 61 | 317 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0204053 | 0.021233501 | 0.00602153 | 0.00627447 | 0.00602153 | 0.00627447 | 11.3 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 233 | Buttisholz | 649928 | 217192 | 1048 | 05.07.2019 | M.m. | 10 | 328 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00894606 | 0.00971623 | 0.00251355 | 0.00264744 | 0.00251355 | 0.00264744 | 322.1 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 234 | Buttisholz | 650000 | 216674 | 1037 | 05.07.2019 | M.m. | 16 | 314 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.016543699 | 0.0221052 | 0.00160132 | 0.0020903 | 0.00160132 | 0.0020903 | 316.6 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 235 | Buttisholz | 650170 | 217184 | 1036 | 05.07.2019 | M.m. | 4 | 235 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.087347098 | 0.067454003 | 0.027132601 | 0.022230599 | 0.027132601 | 0.022230599 | 64.9 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 236 | Buttisholz | 650106 | 217300 | 1075 | 05.07.2019 | M.m. | 0 | 353 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00936675 | 0.00935385 | 0.00252682 | 0.00254557 | 0.00252682 | 0.00254557 | 180.8 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 237 | Buttisholz | 650889 | 216710 | 1063 | 05.07.2019 | M.m. | 10 | 777 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00729194 | 0.0073045 | 0.000753894 | 0.000751637 | 0.000753894 | 0.000751637 | 357.4 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 238 | Buttisholz | 650096 | 216767 | 1249 | 05.07.2019 | M.m. | 8 | 191 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0151567 | 0.0151547 | 0.00262833 | 0.00262986 | 0.00262833 | 0.00262986 | 193.9 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 239 | Buttisholz | 650193 | 216726 | 1032 | 05.07.2019 | M.m. | 3 | 228 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0116145 | 0.0117248 | 0.00262562 | 0.0026533 | 0.00262562 | 0.0026533 | 225.7 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 240 | Buttisholz | 650555 | 217061 | 1073 | 05.07.2019 | M.m. | 7 | 420 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0101138 | 0.0101297 | 0.00317711 | 0.00316981 | 0.00317711 | 0.00316981 | 184.4 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 241 | Buttisholz | 650306 | 217083 | 1056 | 05.07.2019 | M.m. | 20 | 205 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0214666 | 0.021533901 | 0.00605565 | 0.00607456 | 0.00605565 | 0.00607456 | 73.5 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 242 | Buttisholz | 649947 | 217145 | 3314 | 05.07.2019 | M.m. | 6 | 281 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0137451 | 0.0132817 | 0.00274616 | 0.00274335 | 0.00274616 | 0.00274335 | 282.3 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 243 | Buttisholz | 650108 | 217011 | 1029 | 05.07.2019 | M.m. | 6 | 74 | 569 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.047559399 | 0.0460524 | 0.0122678 | 0.0118873 | 0.0122678 | 0.0118873 | 74.3 | Egolzwil | 11.2 | 20.6 | 59.1 | 0 | 0.6 | No light sources around Buttisholz St. Otilien |
| 244 | Buochs | 674622 | 202677 | 1029 | 04.07.2019 | M.m. | 1 | 92 | 230 | 1 | 4 | 1 | 1 | 1 | 1.6 | yes | yes | 0.0295939 | 0.0357887 | 0.00751404 | 0.00884047 | 0.00806708 | 0.00937581 | 41.6 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 245 | Buochs | 674768 | 202750 | 1037 | 04.07.2019 | M.m. | 0 | 72 | 230 | 3 | 1 | 2 | 1 | 6 | 2.6 | yes | yes | 0.088797599 | 0.0858768 | 0.023792701 | 0.0252399 | 0.0248861 | 0.026829099 | 40.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 246 | Buochs | 674735 | 202651 | 1036 | 04.07.2019 | M.m. | 5 | 82 | 230 | 1 | 1 | 1 | 1 | 1 | 1 | no | yes | 0.051177301 | 0.055460401 | 0.0130806 | 0.0141679 | 0.015516 | 0.016731501 | 5.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 247 | Buochs | 674863 | 202578 | 1073 | 04.07.2019 | M.m. | 1 | 219 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00661525 | 0.0150223 | 0.00146334 | 0.00350758 | 0.00257051 | 0.00552865 | 8.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 248 | Buochs | 674944 | 202867 | 1061 | 04.07.2019 | M.m. | 0 | 282 | 230 | 2 | 0.5 | 7 | 2 | 0 | 2.3 | yes | yes | 0.0157311 | 0.0244142 | 0.00424573 | 0.0067553 | 0.00599621 | 0.00811817 | 188.2 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 249 | Buochs | 674808 | 202263 | 1249 | 04.07.2019 | M.m. | 2 | 474 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.02679 | 0.026101099 | 0.0069471 | 0.00677048 | 0.0102376 | 0.00997542 | 9.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 250 | Buochs | 674399 | 202645 | 3314 | 04.07.2019 | M.m. | 6 | 311 | 230 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | yes | yes | 0.0113111 | 0.070340298 | 0.038385 | 0.024219001 | 0.039672501 | 0.025086099 | 264.0 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 251 | Buochs | 674831 | 203059 | 1031 | 04.07.2019 | M.m. | 1 | 359 | 230 | 0.5 | 1 | 1 | 0.5 | 1 | 0.8 | no | yes | 0.059463099 | 0.039400902 | 0.017636299 | 0.0117328 | 0.021320799 | 0.0148869 | 2.8 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 252 | Buochs | 675040 | 202550 | 1032 | 04.07.2019 | M.m. | 2 | 382 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00806864 | 0.00800347 | 0.00205772 | 0.00205657 | 0.00310033 | 0.00309792 | 182.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 253 | Buochs | 675088 | 202858 | 1056 | 04.07.2019 | M.m. | 0 | 410 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00782876 | 0.00782301 | 0.00240817 | 0.0024241 | 0.00241114 | 0.00248414 | 320.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | Mic hung loosely towards ground |
| 254 | Buochs | 674399 | 202920 | 1074 | 04.07.2019 | M.m. | 0 | 359 | 230 | 1 | 1 | 0.5 | 1 | 1 | 0.9 | yes | no | 0.00574043 | 0.0056961 | 0.00156634 | 0.00157485 | 0.00258097 | 0.0025973 | 337.6 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 255 | Buochs | 674527 | 202774 | 1053 | 04.07.2019 | M.m. | 1 | 180 | 230 | 4 | 6 | 4 | 8 | 6 | 5.6 | yes | no | 0.0105381 | 0.0108317 | 0.00251276 | 0.00259221 | 0.00302866 | 0.00309151 | 173.7 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 256 | Buochs | 674494 | 203148 | 1057 | 04.07.2019 | M.m. | 0 | 470 | 230 | 0.5 | 0.5 | 0.5 | 1 | 1 | 0.7 | yes | no | 0.00386776 | 0.00390346 | 0.00124764 | 0.00125829 | 0.0022006 | 0.00221932 | 327.1 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 257 | Buochs | 674660 | 202569 | 1048 | 04.07.2019 | M.m. | 1 | 161 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0139568 | 0.0139246 | 0.00334533 | 0.00334145 | 0.00452773 | 0.00452512 | 82.8 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 258 | Buochs | 674937 | 202736 | 1063 | 04.07.2019 | M.m. | 6 | 237 | 230 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0138166 | 0.0134205 | 0.00371674 | 0.00362866 | 0.00464635 | 0.00452266 | 165.5 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | |
| 259 | Buochs | 674577 | 202903 | 1075 | 04.07.2019 | M.m. | NA | 216 | 230 | 0 | 0 | 0 | 1 | 1 | 0.4 | yes | no | 0.00945755 | 0.00953704 | 0.00267104 | 0.00269885 | 0.00394088 | 0.00398505 | 158.8 | Gersau | 8.3 | 20.1 | 76 | 0 | 1 | NoData -> Manipulation by stranger -> shutdown |
| 260 | Sachseln | 661168 | 190968 | 1061 | 12.06.2019 | R.h. | 0 | 77 | 120 | 5.5 | 3.5 | 5 | 8 | 6 | 5.6 | yes | yes | 0.0550704 | 0.041433901 | 0.0136434 | 0.0101373 | 0.0147731 | 0.010692 | 79.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 261 | Sachseln | 661104 | 190958 | 1073 | 12.06.2019 | R.h. | 0 | 42 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.068193197 | 0.085940003 | 0.0171127 | 0.0211416 | 0.0180273 | 0.022114901 | 8.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 262 | Sachseln | 661427 | 191185 | 1063 | 12.06.2019 | R.h. | 0 | 376 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0251204 | 0.0331835 | 0.00650322 | 0.00847396 | 0.00772174 | 0.00981099 | 369.1 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 263 | Sachseln | 661426 | 191329 | 1075 | 12.06.2019 | R.h. | 0 | 463 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0114347 | 0.011249 | 0.00272599 | 0.00266913 | 0.0033229 | 0.00302065 | 441.0 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 264 | Sachseln | 661055 | 190735 | 1037 | 12.06.2019 | R.h. | 0 | 269 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.019333201 | 0.0203791 | 0.00496764 | 0.00506545 | 0.00592758 | 0.00585688 | 22.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 265 | Sachseln | 661213 | 190572 | 1249 | 12.06.2019 | R.h. | 11 | 443 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00564753 | 0.0117819 | 0.00143069 | 0.00291343 | 0.00192362 | 0.00372224 | 29.0 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 266 | Sachseln | 661141 | 190967 | 3314 | 12.06.2019 | R.h. | 0 | 53 | 120 | 1 | 2 | 1 | 1 | 1 | 1.2 | yes | yes | 0.062819503 | 0.044989601 | 0.0156189 | 0.0109849 | 0.0164374 | 0.0113729 | 46.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 267 | Sachseln | 661108 | 190866 | 1032 | 12.06.2019 | R.h. | 0 | 134 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0433699 | 0.0520139 | 0.0109275 | 0.0128134 | 0.012552 | 0.0144851 | 16.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 268 | Sachseln | 661471 | 190850 | 1031 | 12.06.2019 | R.h. | 1 | 400 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00666365 | 0.00566856 | 0.00158506 | 0.00101716 | 0.00217323 | 0.00169391 | 323.7 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 269 | Sachseln | 660898 | 191019 | 1048 | 12.06.2019 | R.h. | 0 | 203 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0121823 | 0.0121063 | 0.00311958 | 0.00313368 | 0.00453249 | 0.00386163 | 140.0 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 270 | Sachseln | 661207 | 191062 | 1074 | 12.06.2019 | R.h. | 0 | 124 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0211631 | 0.017333699 | 0.005318 | 0.00430948 | 0.00573634 | 0.00456831 | 120.2 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 271 | Sachseln | 660778 | 191241 | 1056 | 12.06.2019 | R.h. | 0 | 402 | 120 | 1 | 0.5 | 0.5 | 0.5 | 1 | 0.7 | no | no | 0.00471207 | 0.00501562 | 0.00110621 | 0.00123368 | 0.00266254 | 0.00216179 | 51.8 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 272 | Sachseln | 661178 | 191182 | 1053 | 12.06.2019 | R.h. | 0 | 198 | 120 | 0 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | yes | no | 0.0129156 | 0.00940546 | 0.00336297 | 0.00247574 | 0.00366911 | 0.00270188 | 159.1 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 273 | Sachseln | 660793 | 190764 | 1029 | 12.06.2019 | R.h. | 0 | 387 | 120 | 1 | 1 | 1 | 1 | 1 | 1 | yes | no | 0.00681935 | 0.00613942 | 0.00224468 | 0.00174475 | 0.00253389 | 0.00216849 | 279.5 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 274 | Sachseln | 661285 | 190968 | 1057 | 12.06.2019 | R.h. | 0 | 188 | 120 | 1 | 1 | 1 | 1 | 1 | 1 | yes | no | 0.017806601 | 0.0150308 | 0.00437933 | 0.0035076 | 0.00513848 | 0.00403192 | 186.0 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |
| 275 | Sachseln | 661130 | 190788 | 1036 | 12.06.2019 | R.h. | 0 | 214 | 120 | 0.5 | 0.5 | 1 | 0 | 0.5 | 0.5 | yes | no | 0.022589 | 0.0247525 | 0.00613968 | 0.00616103 | 0.00751639 | 0.00720044 | 22.6 | Giswil | 4.3 | 14.3 | 91 | 0 | 1.3 | |

| site-ID | Community | x-Koord | y-Koord | Bat-logger | Recording Date | Species | Bat Activity | Distance site to roost [m] | Roost size [individuals] | Lux1 | Lux2 | Lux3 | Lux4 | Lux5 | Lux_mean | light | corridor | Corridor value current_adv 5 | Corridor value current_adv 15 | Corridor value current_subavg 5 | Corridor value current_subavg 15 | Corridor value current_submax 5 | Corridor value current_submax 15 | Distance Site to LCP [m] | Weather Station | Distance Stat. to Roost [km] | Temperature [°C] | Humidity [%] | Precipi-tation [mm] | Wind speed [m/s] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 276 | Giswil | 654480 | 186913 | 1032 | 13.06.2019 | R.h. | 0 | 259 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0179535 | 0.0188703 | 0.00451589 | 0.00474561 | 0.0045918 | 0.00482997 | 262.6 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 277 | Giswil | 654657 | 186897 | 1029 | 13.06.2019 | R.h. | 1 | 159 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.030609701 | 0.0286352 | 0.00769745 | 0.0071988 | 0.00782245 | 0.0073138 | 162.0 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 278 | Giswil | 654851 | 186862 | 1063 | 13.06.2019 | R.h. | 20 | 241 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.027107099 | 0.0228508 | 0.00689518 | 0.00580907 | 0.00708406 | 0.00596295 | 68.1 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 279 | Giswil | 654386 | 187263 | 1053 | 13.06.2019 | R.h. | 8 | 379 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00821557 | 0.0166761 | 0.0021167 | 0.00430526 | 0.00240783 | 0.00531104 | 282.9 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 280 | Giswil | 654668 | 187085 | 1074 | 13.06.2019 | R.h. | 2 | 47 | 400 | 1 | 1 | 1 | 1 | 1 | 1 | no | yes | 0.078404501 | 0.072125897 | 0.019533001 | 0.017927101 | 0.0195641 | 0.017958401 | 47.4 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 281 | Giswil | 654681 | 187006 | 1037 | 13.06.2019 | R.h. | 0 | 48 | 400 | 1 | 1 | 1 | 1 | 1 | 1 | no | yes | 0.065344602 | 0.066509597 | 0.016298199 | 0.016584599 | 0.0164128 | 0.0167011 | 51.2 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 282 | Giswil | 654822 | 187067 | 1249 | 13.06.2019 | R.h. | 1 | 123 | 400 | 0.5 | 0 | 0 | 0.5 | 0.5 | 0.3 | no | yes | 0.046381202 | 0.0398046 | 0.0115464 | 0.00990899 | 0.011768 | 0.0100994 | 46.0 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 283 | Giswil | 654806 | 187107 | 1056 | 13.06.2019 | R.h. | 1 | 120 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0381651 | 0.037795901 | 0.00948874 | 0.00939701 | 0.00969454 | 0.00960148 | 6.4 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 284 | Giswil | 654591 | 187277 | 1031 | 13.06.2019 | R.h. | 1 | 252 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00913645 | 0.00872072 | 0.00229552 | 0.0021936 | 0.00238116 | 0.00227334 | 114.6 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 285 | Giswil | 654356 | 187066 | 1073 | 13.06.2019 | R.h. | 2 | 344 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00521484 | 0.00592286 | 0.00131882 | 0.00149777 | 0.00135323 | 0.00153637 | 346.8 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 286 | Giswil | 654547 | 186735 | 1075 | 13.06.2019 | R.h. | 0 | 350 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0046379 | 0.0047118 | 0.00117862 | 0.00119696 | 0.0012035 | 0.00122183 | 168.3 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 287 | Giswil | 654967 | 187029 | 1036 | 13.06.2019 | R.h. | 2 | 268 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00554224 | 0.0056646 | 0.00154284 | 0.00155735 | 0.00169398 | 0.00169605 | 84.2 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 288 | Giswil | 654985 | 186943 | 1048 | 13.06.2019 | R.h. | 1 | 304 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00713362 | 0.00780743 | 0.00191793 | 0.00208457 | 0.00214833 | 0.00231336 | 30.4 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 289 | Giswil | 654826 | 187188 | 3314 | 13.06.2019 | R.h. | 23 | 187 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.027102301 | 0.027355799 | 0.00667753 | 0.0060338 | 0.00691403 | 0.00727386 | 6.5 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 290 | Giswil | 654469 | 187024 | 1057 | 13.06.2019 | R.h. | 0 | 232 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00760616 | 0.00776254 | 0.00191099 | 0.00195085 | 0.0019318 | 0.0019727 | 235.2 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 291 | Giswil | 654411 | 187204 | 1061 | 13.06.2019 | R.h. | 3 | 327 | 400 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00978755 | 0.00926808 | 0.00250135 | 0.00236684 | 0.00266451 | 0.00249794 | 294.7 | Giswil | 3.3 | 13.8 | 86.3 | 0 | 1.4 | |
| 292 | Beggingen | 682434 | 291313 | 1075 | 11.07.2019 | M.m. | 6 | 84 | 630 | 0 | 0.5 | 0.5 | 0 | 0 | 0.2 | no | yes | 0.251944005 | 0.224160001 | 0.063923702 | 0.056863301 | 0.065123402 | 0.057922799 | 3.5 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 293 | Beggingen | 682548 | 291168 | 1048 | 11.07.2019 | M.m. | 32 | 227 | 630 | 1 | 0.5 | 0.5 | 1 | 1 | 0.8 | yes | yes | 0.074662603 | 0.056938201 | 0.019721201 | 0.0150038 | 0.020161601 | 0.0153581 | 19.3 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 294 | Beggingen | 682205 | 291170 | 1031 | 11.07.2019 | M.m. | 12 | 189 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00936872 | 0.0185706 | 0.0027256 | 0.00276095 | 0.00282476 | 0.00286181 | 31.6 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 295 | Beggingen | 682601 | 291037 | 1037 | 11.07.2019 | M.m. | 7 | 351 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0272955 | 0.060631901 | 0.007168 | 0.015887201 | 0.00737645 | 0.0163853 | 15.5 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 296 | Beggingen | 682535 | 290938 | 1061 | 11.07.2019 | M.m. | 3 | 392 | 630 | 1 | 0.5 | 0.5 | 1 | 0.5 | 0.7 | yes | yes | 0.035232101 | 0.0414485 | 0.009031 | 0.0099929 | 0.00926347 | 0.010255 | 69.6 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 297 | Beggingen | 682684 | 291464 | 1074 | 11.07.2019 | M.m. | 14 | 375 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00220251 | 0.019132299 | 0.000700755 | 0.00477712 | 0.000730009 | 0.00489382 | 231.7 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 298 | Beggingen | 682077 | 291178 | 1029 | 11.07.2019 | M.m. | 2 | 297 | 630 | 1 | 1 | 2 | 1 | 2 | 1.4 | yes | yes | 0.096808702 | 0.113023996 | 0.0250593 | 0.0290263 | 0.0261587 | 0.0303976 | 6.4 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 299 | Beggingen | 682277 | 291312 | 1249 | 11.07.2019 | M.m. | 6 | 81 | 630 | 0 | 0.5 | 0.5 | 0 | 0 | 0.2 | no | yes | 0.0878148 | 0.084667496 | 0.021661701 | 0.0208993 | 0.021897299 | 0.021134101 | 75.7 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 300 | Beggingen | 682187 | 291465 | 1063 | 11.07.2019 | M.m. | 4 | 245 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00616904 | 0.00647327 | 0.00125619 | 0.0013141 | 0.00127833 | 0.00133537 | 226.1 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 301 | Beggingen | 682436 | 291460 | 1036 | 11.07.2019 | M.m. | 3 | 192 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00384581 | 0.00385527 | 0.000792682 | 0.000795323 | 0.00080763 | 0.000810323 | 135.2 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 302 | Beggingen | 682259 | 291112 | 1056 | 11.07.2019 | M.m. | 5 | 198 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00668015 | 0.00663158 | 0.00172672 | 0.00171412 | 0.00173749 | 0.00172502 | 54.6 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 303 | Beggingen | 682252 | 291248 | 1032 | 11.07.2019 | M.m. | 0 | 109 | 630 | 1 | 1 | 1 | 1 | 0 | 0.8 | yes | no | 0.0111222 | 0.0109764 | 0.00286651 | 0.00282554 | 0.00291634 | 0.00287606 | 55.1 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 304 | Beggingen | 681916 | 291295 | 3314 | 11.07.2019 | M.m. | 0 | 438 | 630 | 0 | 0 | 0 | 0 | 1 | 0.2 | yes | no | 0.00529078 | 0.00538242 | 0.0014476 | 0.00146082 | 0.00151803 | 0.00153368 | 118.8 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 305 | Beggingen | 682404 | 290897 | 1073 | 11.07.2019 | M.m. | 1 | 392 | 630 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00413246 | 0.00413465 | 0.00107797 | 0.00107854 | 0.00108989 | 0.00109047 | 157.7 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 306 | Beggingen | 682290 | 291343 | 1053 | 11.07.2019 | M.m. | 1 | 86 | 630 | 1 | 1 | 1 | 1 | 3 | 1.4 | yes | no | 0.0144995 | 0.0142334 | 0.00379865 | 0.00383569 | 0.00390854 | 0.00394467 | 72.4 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 307 | Beggingen | 682054 | 291007 | 1057 | 11.07.2019 | M.m. | 9 | 410 | 630 | 1 | 1 | 1 | 0 | 1 | 0.8 | yes | no | 0.00882035 | 0.00858564 | 0.00230541 | 0.0022431 | 0.00240597 | 0.0023354 | 176.8 | Hallau | 9.2 | 13.7 | 91.2 | 0 | 0.3 | |
| 308 | Flawil | 733428 | 252728 | 1037 | 20.07.2019 | M.m. | 2 | 71 | 275 | 1 | 1 | 1 | 5 | 9 | 3.4 | yes | yes | 0.051743001 | 0.052145399 | 0.0127898 | 0.0129032 | 0.0129374 | 0.0130316 | 67.8 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 309 | Flawil | 733568 | 252663 | 1053 | 20.07.2019 | M.m. | 14 | 94 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.056136299 | 0.0566145 | 0.0139407 | 0.0140601 | 0.0140576 | 0.0141772 | 96.9 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 310 | Flawil | 733216 | 252876 | 1074 | 20.07.2019 | M.m. | 3 | 328 | 275 | 1 | 1 | 1 | 2 | 2 | 1.4 | yes | yes | 0.0105375 | 0.015965501 | 0.00247048 | 0.00372779 | 0.00266908 | 0.00404473 | 290.3 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 311 | Flawil | 733559 | 252513 | 1036 | 20.07.2019 | M.m. | 39 | 182 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0256109 | 0.092813604 | 0.027184799 | 0.025423599 | 0.033135299 | 0.0308521 | 6.5 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 312 | Flawil | 733423 | 252941 | 1061 | 20.07.2019 | M.m. | 3 | 271 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0265834 | 0.0269539 | 0.00626556 | 0.00635289 | 0.00672355 | 0.00681766 | 193.7 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 313 | Flawil | 733403 | 252365 | 1073 | 20.07.2019 | M.m. | 2 | 318 | 275 | 3 | 3 | 5 | 3 | 2 | 3.2 | yes | yes | 0.00351712 | 0.00965945 | 0.011821 | 0.00972116 | 0.025599699 | 0.0209384 | 191.1 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 314 | Flawil | 733618 | 252852 | 3314 | 20.07.2019 | M.m. | 1 | 228 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.100033998 | 0.084406301 | 0.025125301 | 0.021164799 | 0.025395 | 0.021362901 | 212.4 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 315 | Flawil | 733833 | 252818 | 1249 | 20.07.2019 | M.m. | 1 | 386 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00414227 | 0.094037697 | 0.000605611 | 0.0177618 | 0.00119773 | 0.0248843 | 14.1 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 316 | Flawil | 733654 | 252641 | 1032 | 20.07.2019 | M.m. | 7 | 182 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0153351 | 0.0155551 | 0.00394102 | 0.00401814 | 0.00397337 | 0.00405112 | 58.0 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 317 | Flawil | 733323 | 252668 | 1031 | 20.07.2019 | M.m. | 0 | 152 | 275 | 1 | 3 | 2 | 1 | 1 | 1.6 | yes | no | 0.0126994 | 0.0128939 | 0.00330984 | 0.00336066 | 0.0034218 | 0.00347226 | 128.7 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 318 | Flawil | 733514 | 252451 | 1063 | 20.07.2019 | M.m. | 0 | 227 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00943343 | 0.0103051 | 0.00156338 | 0.00254941 | 0.00232491 | 0.00372201 | 58.2 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 319 | Flawil | 733638 | 252411 | 1048 | 20.07.2019 | M.m. | 4 | 310 | 275 | 0.5 | 0 | 0 | 0 | 0.5 | 0.2 | no | no | 0.00125622 | 0.00126555 | 0.000577879 | 0.000585249 | 0.000844561 | 0.000855869 | 110.7 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 320 | Flawil | 733471 | 252949 | 1075 | 20.07.2019 | M.m. | 0 | 274 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0151131 | 0.0155673 | 0.00358104 | 0.00368824 | 0.00381701 | 0.00393184 | 155.3 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 321 | Flawil | 733030 | 252534 | 1029 | 20.07.2019 | M.m. | 0 | 467 | 275 | 1 | 1 | 11 | 1 | 1 | 3 | yes | no | 0.00145064 | 0.00148091 | 0.000576334 | 0.000590877 | 0.000755099 | 0.000775173 | 433.8 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 322 | Flawil | 733399 | 252666 | 1056 | 20.07.2019 | M.m. | 0 | 77 | 275 | 1 | 1 | 1 | 2 | 1 | 1.2 | yes | no | 0.034150001 | 0.035106499 | 0.00836888 | 0.00856437 | 0.00850649 | 0.00870585 | 52.7 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 323 | Flawil | 733150 | 252897 | 1057 | 20.07.2019 | M.m. | 0 | 394 | 275 | 3 | 2 | 3 | 3 | 7 | 3.6 | yes | no | 0.00380405 | 0.00384613 | 0.000847061 | 0.000855607 | 0.00097703 | 0.000987803 | 290.3 | Bischofszell | 9.8 | 20 | 89.5 | 0 | 0.8 | |
| 324 | Lipperswil | 721428 | 275258 | 1073 | 18.06.2019 | M.m. | 11 | 71 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.090892702 | 0.090695202 | 0.023040401 | 0.0247366 | 0.023726599 | 0.0307754 | 56.5 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | Road under construction -> all street lamps powered off |
| 325 | Lipperswil | 721329 | 275187 | 1063 | 18.06.2019 | M.m. | 9 | 110 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000457543 | 0.00045607 | 0.000494731 | 0.00833125 | 0.00121586 | 0.00986565 | 16.3 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 326 | Lipperswil | 721100 | 275258 | 1057 | 18.06.2019 | M.m. | 0 | 267 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.201517999 | 0.465588003 | 0.030018 | 0.069314703 | 0.058102001 | 0.134302005 | 7.1 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | Road under construction -> all street lamps powered off |
| 327 | Lipperswil | 721162 | 275250 | 1037 | 18.06.2019 | M.m. | 0 | 207 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00898239 | 0.00896588 | 0.00164196 | 0.02236101 | 0.00268878 | 0.0252329 | 15.5 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 328 | Lipperswil | 721557 | 275242 | 1029 | 18.06.2019 | M.m. | 4 | 198 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.121441998 | 0.097786203 | 0.0416109 | 0.033547599 | 0.091360301 | 0.073654301 | 185.7 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | Road under construction -> all street lamps powered off |
| 329 | Lipperswil | 721762 | 275389 | 1074 | 18.06.2019 | M.m. | 2 | 409 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000250857 | 0.014649 | 0.000181786 | 0.00291695 | 0.000570105 | 0.00422754 | 407.8 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 330 | Lipperswil | 721736 | 275242 | 1061 | 18.06.2019 | M.m. | 2 | 374 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 7.13815E-06 | 1.14955E-05 | 3.1096E-06 | 4.26907E-06 | 5.71874E-06 | 7.25753E-06 | 364.6 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | Road under construction -> all street lamps powered off |
| 331 | Lipperswil | 721002 | 275150 | 1249 | 18.06.2019 | M.m. | 15 | 389 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000181667 | 0.032868899 | 0.000162024 | 0.0028886 | 0.000347127 | 0.00619723 | 4.9 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 332 | Lipperswil | 721392 | 275352 | 1053 | 18.06.2019 | M.m. | 7 | 67 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0146383 | 0.014495 | 0.003429 | 0.00339532 | 0.00370413 | 0.00366792 | 83.1 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 333 | Lipperswil | 721543 | 275393 | 1036 | 18.06.2019 | M.m. | 1 | 205 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00413215 | 0.00400478 | 0.000915474 | 0.000900641 | 0.00110613 | 0.00106984 | 210.2 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 334 | Lipperswil | 721236 | 275098 | 1032 | 18.06.2019 | M.m. | 2 | 232 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000571404 | 0.000570848 | 0.000588374 | 0.000587802 | 0.0013422 | 0.00134089 | 108.5 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 335 | Lipperswil | 721521 | 275598 | 1031 | 18.06.2019 | M.m. | 2 | 344 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00469215 | 0.00472618 | 0.000816804 | 0.000822629 | 0.00128807 | 0.00129742 | 236.7 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 336 | Lipperswil | 721319 | 274867 | 1048 | 18.06.2019 | M.m. | 1 | 426 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000534449 | 0.000534625 | 0.000555271 | 0.000555082 | 0.00124462 | 0.00124419 | 334.5 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 337 | Lipperswil | 721458 | 275113 | 3314 | 18.06.2019 | M.m. | 0 | 201 | 186 | 0.5 | 0.5 | 1 | 1 | 0.5 | 0.7 | no | no | 0.000469083 | 0.000472359 | 0.000496669 | 0.000496436 | 0.00121562 | 0.00122229 | 159.1 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 338 | Lipperswil | 721186 | 275355 | 1056 | 18.06.2019 | M.m. | 9 | 190 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00845541 | 0.00880752 | 0.00140899 | 0.0014598 | 0.00226915 | 0.00234271 | 84.5 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | |
| 339 | Lipperswil | 721279 | 275260 | 1075 | 18.06.2019 | M.m. | 5 | 91 | 186 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0060312 | 0.00613996 | 0.00181121 | 0.00187757 | 0.00235073 | 0.00242029 | 42.3 | Salen-Reutenen | 4.4 | 17.8 | 65.6 | 0 | 2.6 | Road under construction -> all street lamps powered off |
| 340 | Surcasti | 732952 | 173226 | 1053 | 27.06.2019 | R.h. | 10 | 37 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.088836104 | 0.096178003 | 0.022444099 | 0.0242409 | 0.0224442 | 0.024241 | 38.2 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 341 | Surcasti | 732974 | 173315 | 1037 | 27.06.2019 | R.h. | 5 | 125 | 202 | 0.5 | 0 | 0 | 0 | 0 | 0.1 | no | yes | 0.030677799 | 0.032478798 | 0.00667638 | 0.00717738 | 0.00667641 | 0.0071774 | 126.7 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 342 | Surcasti | 732954 | 173464 | 1073 | 27.06.2019 | R.h. | 4 | 266 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0109809 | 0.0109281 | 0.00216686 | 0.00239319 | 0.00216687 | 0.00239322 | 267.9 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 343 | Surcasti | 732942 | 173080 | 1036 | 27.06.2019 | R.h. | 14 | 121 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.037014902 | 0.0335797 | 0.00927658 | 0.00841578 | 0.00927679 | 0.00841598 | 89.6 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 344 | Surcasti | 732909 | 173014 | 1048 | 27.06.2019 | R.h. | 18 | 187 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.018311599 | 0.0181941 | 0.0048063 | 0.00469426 | 0.00480697 | 0.00469492 | 162.2 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 345 | Surcasti | 733022 | 173157 | 1075 | 27.06.2019 | R.h. | 3 | 106 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.037972499 | 0.039378099 | 0.00954207 | 0.0098954 | 0.00954289 | 0.00989625 | 9.5 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 346 | Surcasti | 733018 | 173332 | 3314 | 27.06.2019 | R.h. | 0 | 161 | 202 | 0.5 | 0 | 0 | 0 | 0 | 0.1 | no | yes | 0.023061801 | 0.0242288 | 0.00577103 | 0.00606328 | 0.00577108 | 0.00606335 | 162.7 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 347 | Surcasti | 732730 | 173375 | 1056 | 27.06.2019 | R.h. | 0 | 262 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0261642 | 0.02692 | 0.00651937 | 0.00670771 | 0.00652076 | 0.00670914 | 264.8 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 348 | Surcasti | 733116 | 172924 | 1061 | 27.06.2019 | R.h. | 1 | 336 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0413615 | 0.031450301 | 0.0103739 | 0.00788812 | 0.0103789 | 0.00789176 | 156.9 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 349 | Surcasti | 732750 | 173031 | 1031 | 27.06.2019 | R.h. | 0 | 243 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0107092 | 0.0106241 | 0.00267154 | 0.00265052 | 0.00267177 | 0.00265075 | 242.6 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 350 | Surcasti | 733141 | 173212 | 1029 | 27.06.2019 | R.h. | 0 | 216 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.016654 | 0.0167301 | 0.00417523 | 0.00419458 | 0.00417527 | 0.00419481 | 82.5 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 351 | Surcasti | 732824 | 172793 | 1074 | 27.06.2019 | R.h. | 0 | 419 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00553699 | 0.00519277 | 0.00117102 | 0.00118186 | 0.0011713 | 0.00118215 | 398.9 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 352 | Surcasti | 733095 | 173092 | 1249 | 27.06.2019 | R.h. | 5 | 201 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.021281799 | 0.0212788 | 0.00534012 | 0.00533935 | 0.00534218 | 0.00534142 | 36.8 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 353 | Surcasti | 733063 | 173551 | 1032 | 27.06.2019 | R.h. | 2 | 377 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0059812 | 0.00618707 | 0.00149439 | 0.00154583 | 0.00149474 | 0.0015462 | 378.9 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 354 | Surcasti | 732714 | 173260 | 1063 | 27.06.2019 | R.h. | 0 | 219 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.015794501 | 0.015796799 | 0.00385726 | 0.00385512 | 0.00385753 | 0.00385539 | 221.5 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |
| 355 | Surcasti | 732882 | 173433 | 1057 | 27.06.2019 | R.h. | 0 | 237 | 202 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0133309 | 0.0133527 | 0.00332617 | 0.00333161 | 0.00332642 | 0.00333186 | 239.7 | Vals | 7.7 | 16.3 | 84.9 | 0 | 0.5 | |

| site-ID | Community | x-Koord | y-Koord | Bat-logger | Recording Date | Species | Bat Activity | Distance site to roost [m] | Roost size [individuals] | Lux1 | Lux2 | Lux3 | Lux4 | Lux5 | Lux_mean | light | corridor | Corridor value current_adv 5 | Corridor value current_adv 15 | Corridor value current_subavg 5 | Corridor value current_subavg 15 | Corridor value current_submax 5 | Corridor value current_submax 15 | Distance Site to LCP [m] | Weather Station | Distance Stat. to Roost [km] | Temperature [°C] | Humidity [%] | Precipi-tation [mm] | Wind speed [m/s] | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 356 | Uors | 733380 | 173632 | 3314 | 26.07.2019 | R.h. | 7 | 46 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.126379997 | 0.119418003 | 0.031645101 | 0.0299049 | 0.031648099 | 0.0299071 | 27.1 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 357 | Uors | 733385 | 173654 | 1061 | 26.07.2019 | R.h. | 8 | 49 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.130123004 | 0.127959996 | 0.032672901 | 0.032127898 | 0.032683101 | 0.032138798 | 6.4 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 358 | Uors | 733364 | 173613 | 1063 | 26.07.2019 | R.h. | 1 | 62 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.077752702 | 0.082999296 | 0.019332301 | 0.0205868 | 0.0193389 | 0.0206396 | 51.5 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 359 | Uors | 733456 | 173658 | 1032 | 26.07.2019 | R.h. | 0 | 45 | 234 | 23 | 10 | 28 | 12 | 21 | 18.8 | yes | yes | 0.064424902 | 0.065712303 | 0.016099401 | 0.016417401 | 0.0161027 | 0.0164207 | 42.8 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 360 | Uors | 733376 | 173782 | 1037 | 26.07.2019 | R.h. | 144 | 164 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0059277 | 0.065462798 | 0.00148841 | 0.016406201 | 0.00148886 | 0.016426001 | 26.7 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 361 | Uors | 733335 | 173834 | 1036 | 26.07.2019 | R.h. | 24 | 228 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00310856 | 0.084368899 | 0.000779357 | 0.0211384 | 0.000779602 | 0.021154899 | 21.9 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 362 | Uors | 733309 | 173570 | 1249 | 26.07.2019 | R.h. | 1 | 128 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00396728 | 0.0517013 | 0.024531599 | 0.0206326 | 0.049063299 | 0.040685602 | 78.5 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 363 | Uors | 733410 | 173725 | 1031 | 26.07.2019 | R.h. | 3 | 101 | 234 | 0.5 | 0.5 | 0.5 | 0 | 0 | 0.3 | no | yes | 0.031860299 | 0.0320214 | 0.0078814 | 0.00870147 | 0.00788365 | 0.00870396 | 58.0 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 364 | Uors | 733467 | 173783 | 1075 | 26.07.2019 | R.h. | 0 | 163 | 234 | 0 | 0 | 0.5 | 0 | 0.5 | 0.2 | no | no | 0.00634361 | 0.00638909 | 0.00158721 | 0.00159948 | 0.0015877 | 0.00159998 | 116.1 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 365 | Uors | 733563 | 173775 | 1048 | 26.07.2019 | R.h. | 0 | 204 | 234 | 7 | 6 | 4 | 7 | 10 | 6.8 | yes | no | 0.00778152 | 0.00722024 | 0.00183183 | 0.00178637 | 0.00183243 | 0.00178695 | 198.2 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 366 | Uors | 733479 | 173490 | 1056 | 26.07.2019 | R.h. | 1 | 145 | 234 | 0.5 | 0 | 0.5 | 0.5 | 0.5 | 0.4 | no | no | 0.0130101 | 0.0130542 | 0.00309136 | 0.0031294 | 0.00309525 | 0.003133 | 89.1 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 367 | Uors | 733550 | 173447 | 1029 | 26.07.2019 | R.h. | 3 | 218 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00732518 | 0.00669815 | 0.00182589 | 0.00166955 | 0.00182761 | 0.00167113 | 105.4 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 368 | Uors | 733496 | 174014 | 1053 | 26.07.2019 | R.h. | 1 | 395 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000895059 | 0.000895039 | 0.000212841 | 0.000212849 | 0.000212909 | 0.000212917 | 121.6 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 369 | Uors | 733718 | 173898 | 1073 | 26.07.2019 | R.h. | 1 | 400 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00125941 | 0.0011664 | 0.000330179 | 0.000306759 | 0.000330288 | 0.00030686 | 365.4 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 370 | Uors | 733376 | 173575 | 1074 | 26.07.2019 | R.h. | 0 | 70 | 234 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.038130298 | 0.038036101 | 0.00863949 | 0.00862702 | 0.00864227 | 0.00863016 | 68.7 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 371 | Uors | 733471 | 173561 | 1057 | 26.07.2019 | R.h. | 2 | 79 | 234 | 1 | 0.5 | 0 | 1 | 0.5 | 0.6 | yes | no | 0.031008599 | 0.029631499 | 0.00771343 | 0.00737129 | 0.00771445 | 0.00737214 | 82.1 | Vals | 8.1 | 15.9 | 78.8 | 0 | 0.4 | |
| 372 | Waltensburg | 728210 | 182037 | 1031 | 25.06.2019 | R.h. | 9 | 95 | 105 | 0.5 | 0.5 | 0 | 0 | 0.5 | 0.3 | no | yes | 0.153818995 | 0.153289005 | 0.038490999 | 0.031748898 | 0.0387692 | 0.039979398 | 42.5 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 373 | Waltensburg | 728282 | 182053 | 1053 | 25.06.2019 | R.h. | 5 | 21 | 105 | 1 | 1 | 1 | 2 | 2 | 1.4 | yes | yes | 0.090466097 | 0.088178203 | 0.022642599 | 0.0189212 | 0.022654399 | 0.0225062 | 24.0 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 374 | Waltensburg | 728330 | 181780 | 1063 | 25.06.2019 | R.h. | 0 | 275 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00621011 | 0.0069317 | 0.0015478 | 0.00172764 | 0.00155218 | 0.00173255 | 236.6 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 375 | Waltensburg | 728226 | 181971 | 1037 | 25.06.2019 | R.h. | 0 | 113 | 105 | 1 | 0.5 | 1 | 0.5 | 1 | 0.8 | no | yes | 0.057695601 | 0.062399201 | 0.0143507 | 0.0155206 | 0.014358 | 0.0155306 | 41.2 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 376 | Waltensburg | 728395 | 182167 | 1048 | 25.06.2019 | R.h. | 2 | 146 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000752345 | 0.058974098 | 9.1856E-05 | 0.0104921 | 0.000183712 | 0.020907501 | 23.3 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 377 | Waltensburg | 728193 | 181868 | 1057 | 25.06.2019 | R.h. | 1 | 216 | 105 | 1 | 0.5 | 0.5 | 0.5 | 0 | 0.5 | no | yes | 0.012749 | 0.0116683 | 0.00317616 | 0.00290692 | 0.00318341 | 0.00291357 | 147.1 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 378 | Waltensburg | 728456 | 181694 | 1061 | 25.06.2019 | R.h. | 0 | 391 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000703515 | 0.0094279 | 0.000175087 | 0.0023503 | 0.000175967 | 0.00235816 | 369.6 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 379 | Waltensburg | 728304 | 181986 | 1073 | 25.06.2019 | R.h. | 0 | 68 | 105 | 1 | 0.5 | 1 | 1 | 2 | 1.1 | yes | yes | 0.0368011 | 0.0391666 | 0.00918612 | 0.00977557 | 0.00919958 | 0.00978932 | 54.1 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 380 | Waltensburg | 727937 | 181713 | 1029 | 25.06.2019 | R.h. | 1 | 500 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00112977 | 0.00108758 | 0.00028143 | 0.00027092 | 0.000283096 | 0.000272525 | 428.2 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 381 | Waltensburg | 728045 | 181807 | 1249 | 25.06.2019 | R.h. | 1 | 357 | 105 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | no | no | 0.00312606 | 0.00348997 | 0.000778366 | 0.000868994 | 0.000782559 | 0.000873498 | 285.1 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 382 | Waltensburg | 728110 | 182137 | 1075 | 25.06.2019 | R.h. | 0 | 210 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00036641 | 0.000369862 | 9.0993E-05 | 9.1842E-05 | 9.1912E-05 | 9.2866E-05 | 163.2 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 383 | Waltensburg | 728754 | 182057 | 1032 | 25.06.2019 | R.h. | 0 | 451 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000216358 | 0.000215859 | 5.4194E-05 | 5.4069E-05 | 5.4817E-05 | 5.4691E-05 | 355.0 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 384 | Waltensburg | 728011 | 181875 | 1074 | 25.06.2019 | R.h. | 0 | 342 | 105 | 7 | 4 | 5 | 7 | 15 | 7.6 | yes | no | 0.00190562 | 0.00208477 | 0.000474266 | 0.00051885 | 0.000476798 | 0.000521667 | 273.1 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 385 | Waltensburg | 728543 | 182178 | 1036 | 25.06.2019 | R.h. | 0 | 270 | 105 | 1 | 1 | 1 | 2 | 2 | 1.4 | yes | no | 0.000761245 | 0.000798671 | 0.0001894 | 0.00019871 3 | 0.00018976 4 | 0.00019909 6 | 120.2 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 386 | Waltensburg | 728414 | 182120 | 1056 | 25.06.2019 | R.h. | 0 | 129 | 105 | 1 | 0.5 | 1 | 1 | 1 | 0.9 | yes | no | 0.00513024 | 0.0052278 | 0.00127922 | 0.00130356 | 0.00128386 | 0.0013082 | 70.0 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 387 | Waltensburg | 728492 | 181947 | 3314 | 25.06.2019 | R.h. | 0 | 217 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00249431 | 0.00250305 | 0.000622196 | 0.000624325 | 0.000624538 | 0.000626595 | 245.8 | Ilanz | 7.4 | 19.3 | 75.3 | 0 | noData | |
| 388 | Castiel | 764975 | 189797 | 1056 | 24.06.2019 | R.h. | 1 | 53 | 67 | 0.5 | 0 | 0 | 0 | 0 | 0.1 | yes | yes | 0.088200301 | 0.090960398 | 0.0221755 | 0.0206035 | 0.0221854 | 0.0236244 | 5.7 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | close by street lamp not working |
| 389 | Castiel | 764988 | 189632 | 1029 | 24.06.2019 | R.h. | 0 | 119 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00843062 | 0.0149321 | 0.0021415 | 0.00376488 | 0.00214599 | 0.0037727 | 121.4 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 390 | Castiel | 765003 | 189562 | 1249 | 24.06.2019 | R.h. | 0 | 188 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00133277 | 0.00138408 | 0.000353808 | 0.000367442 | 0.000354913 | 0.000368589 | 140.5 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 391 | Castiel | 765042 | 189834 | 1048 | 24.06.2019 | R.h. | 0 | 94 | 67 | 1 | 0.5 | 1 | 1 | 1 | 0.9 | yes | yes | 0.036563098 | 0.0386995 | 0.00802698 | 0.00734798 | 0.0095636 | 0.00877558 | 50.5 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 392 | Castiel | 765101 | 189812 | 1036 | 24.06.2019 | R.h. | 0 | 119 | 67 | 8 | 2 | 9 | 2 | 53 | 14.8 | yes | yes | 0.0129917 | 0.012443 | 0.00329297 | 0.00315427 | 0.00330196 | 0.00316339 | 99.0 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 393 | Castiel | 765444 | 189809 | 1074 | 24.06.2019 | R.h. | 0 | 448 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.000238722 | 0.00442772 | 2.7893 4E-05 | 0.000967592 | 3.0191 1E-05 | 0.00100457 | 441.5 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 394 | Castiel | 765136 | 190007 | 1075 | 24.06.2019 | R.h. | 0 | 291 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00330289 | 0.00403305 | 0.000871433 | 0.00105866 | 0.000884767 | 0.00107143 | 242.9 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 395 | Castiel | 764945 | 189742 | 1031 | 24.06.2019 | R.h. | 2 | 56 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.081504501 | 0.0827718 | 0.0204057 | 0.020723499 | 0.0204826 | 0.020800101 | 44.1 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 396 | Castiel | 765239 | 189774 | 1037 | 24.06.2019 | R.h. | 0 | 240 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00274767 | 0.00274941 | 0.000939812 | 0.00094024 8 | 0.000954663 | 0.000955098 | 236.5 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 397 | Castiel | 765173 | 189541 | 1063 | 24.06.2019 | R.h. | 0 | 271 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00190939 | 0.00191407 | 0.000616443 | 0.000617265 | 0.000619543 | 0.000620368 | 271.7 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 398 | Castiel | 765015 | 189905 | 1061 | 24.06.2019 | R.h. | 0 | 156 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 2.57172E-06 | 2.86669E-06 | 2.64889E-06 | 3.32107E-06 | 3.94735E-06 | 4.94936E-06 | 99.1 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 399 | Castiel | 765166 | 189863 | 3314 | 24.06.2019 | R.h. | 0 | 201 | 67 | 24 | 22 | 24 | 20 | 17 | 21.4 | yes | no | 0.00418781 | 0.00417093 | 0.00110469 | 0.00109987 | 0.00112081 | 0.00111559 | 174.3 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 400 | Castiel | 765317 | 189974 | 1057 | 24.06.2019 | R.h. | 0 | 388 | 67 | 0.5 | 0.5 | 0 | 1 | 1 | 0.6 | yes | no | 0.000624426 | 0.000622663 | 0.000148789 | 0.000146689 | 0.000155183 | 0.000153054 | 358.2 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 401 | Castiel | 764792 | 189722 | 1053 | 24.06.2019 | R.h. | 0 | 210 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 4.64381E-08 | 6.34609E-08 | 5.49759E-08 | 5.54313E-08 | 8.32348E-08 | 8.39203E-08 | 70.5 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 402 | Castiel | 765139 | 190107 | 1073 | 24.06.2019 | R.h. | 0 | 383 | 67 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.000873287 | 0.000879965 | 0.00022512 | 0.00022687 | 0.00022781 | 0.000229571 | 331.2 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 403 | Castiel | 765196 | 189957 | 1032 | 24.06.2019 | R.h. | 0 | 285 | 67 | 25 | 3 | 11 | 6 | 26 | 14.2 | yes | no | 0.00160237 | 0.00160412 | 0.000418408 | 0.000418853 | 0.000421676 | 0.000422138 | 247.6 | Chur | 6.5 | 21.5 | 67.5 | 0 | 1.9 | |
| 180a | Embrach1 | 687202 | 261820 | 1048 | 25.05.2019 | M.m | 2 | 56 | 298 | 0.5 | 0.5 | 1 | 0.5 | 0.5 | 0.6 | no | yes | 0.058149301 | 0.184590995 | 0.0150071 | 0.046457201 | 0.0161207 | 0.048870001 | 5.7 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 181a | Embrach1 | 687165 | 261732 | 1061 | 25.05.2019 | M.m | 1 | 70 | 298 | 1 | 5 | 13 | 1 | 1 | 4.2 | yes | yes | 0.058679398 | 0.054562598 | 0.0147983 | 0.0137558 | 0.0150457 | 0.013986 | 65.5 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 182a | Embrach1 | 687257 | 261644 | 1056 | 25.05.2019 | M.m | 41 | 189 | 298 | 1 | 0.5 | 1 | 1 | 0 | 0.7 | yes | yes | 0.0251463 | 0.022992499 | 0.00672174 | 0.00606201 | 0.00753773 | 0.0073242 | 149.9 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 183a | Embrach1 | 686964 | 262127 | 1032 | 25.05.2019 | M.m | 0 | 376 | 298 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0116323 | 0.0163895 | 0.00294769 | 0.00408229 | 0.00309796 | 0.00432129 | 2.9 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 184a | Embrach1 | 687270 | 261857 | 1063 | 25.05.2019 | M.m | 3 | 133 | 298 | 16 | 32 | 15 | 7 | 7 | 15.4 | yes | yes | 0.179600999 | 0.139813006 | 0.044874702 | 0.0349393 | 0.0478625 | 0.037262201 | 2.5 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | Dimable street lamp |
| 185a | Embrach1 | 686976 | 261768 | 1053 | 25.05.2019 | M.m | 0 | 177 | 298 | 3 | 4 | 5 | 3 | 2 | 3.4 | yes | yes | 0.0554705 | 0.040966101 | 0.0134787 | 0.00994195 | 0.015335 | 0.0113258 | 175.2 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 186a | Embrach1 | 686988 | 261961 | 1073 | 25.05.2019 | M.m | 0 | 228 | 298 | 1 | 0 | 0 | 1 | 0.5 | 0.5 | no | yes | 0.094967298 | 0.071259603 | 0.0234251 | 0.0175818 | 0.024746301 | 0.018607199 | 25.7 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 187a | Embrach1 | 687188 | 261997 | 1036 | 25.05.2019 | M.m | 0 | 201 | 298 | 0 | 0 | 0 | 0.5 | 0.5 | 0.2 | no | yes | 0.0142731 | 0.016572 | 0.00349355 | 0.00410471 | 0.00389818 | 0.00454519 | 17.1 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 188a | Embrach1 | 687259 | 261420 | 1031 | 25.05.2019 | M.m | 3 | 395 | 298 | 0 | 0 | 1 | 0 | 0 | 0.2 | no | no | 0.0101399 | 0.00959102 | 0.00282424 | 0.00266116 | 0.00323758 | 0.00304776 | 380.0 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 189a | Embrach1 | 686808 | 261623 | 1057 | 25.05.2019 | M.m | 5 | 385 | 298 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00790154 | 0.00799528 | 0.00185549 | 0.00187756 | 0.00231379 | 0.00234117 | 381.7 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 190a | Embrach1 | 687058 | 261809 | 1074 | 25.05.2019 | M.m | 0 | 92 | 298 | 7 | 7 | 5 | 10 | 19 | 9.6 | yes | no | 0.0294617 | 0.0312146 | 0.00725339 | 0.00768554 | 0.00790595 | 0.00837566 | 95.2 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 191a | Embrach1 | 687274 | 262058 | 1029 | 25.05.2019 | M.m | 0 | 286 | 298 | 0.5 | 0 | 0 | 0 | 0.5 | 0.2 | no | no | 0.00526866 | 0.00530425 | 0.00137856 | 0.00138692 | 0.00151097 | 0.00150377 | 100.0 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 192a | Embrach1 | 687577 | 261892 | 1249 | 25.05.2019 | M.m | 0 | 437 | 298 | 6 | 5 | 7 | 8 | 4 | 6 | yes | no | 0.00680838 | 0.0068338 | 0.00183733 | 0.0018441 | 0.00248981 | 0.00249897 | 24.5 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 193a | Embrach1 | 687034 | 261592 | 1037 | 25.05.2019 | M.m | 0 | 238 | 298 | 1 | 1 | 0.5 | 1 | 3 | 1.3 | yes | no | 0.00983389 | 0.00990283 | 0.00234009 | 0.00237037 | 0.00293923 | 0.00295041 | 236.9 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 194a | Embrach1 | 687398 | 261711 | 3314 | 25.05.2019 | M.m | 0 | 263 | 298 | 2 | 3 | 2 | 2 | 5 | 2.8 | yes | no | 0.00886622 | 0.00875544 | 0.0023448 | 0.00231568 | 0.00282245 | 0.00278963 | 128.7 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 195a | Embrach1 | 687320 | 261916 | 1075 | 25.05.2019 | M.m | 2 | 206 | 298 | 0 | 0.5 | 0.5 | 0.5 | 0 | 0.3 | no | no | 0.0153001 | 0.015382 | 0.00399977 | 0.00398736 | 0.00469089 | 0.00464198 | 66.8 | Zürich/Kloten | 5.1 | 12.5 | 95.5 | 0 | 1.4 | |
| 308a | Flawil1 | 733426 | 252730 | 1053 | 19.06.2019 | M.m | 1 | 74 | 275 | 1 | 1 | 1 | 5 | 9 | 3.4 | yes | yes | 0.053722698 | 0.056761101 | 0.0127898 | 0.0129032 | 0.0129374 | 0.0130316 | 70.4 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 309a | Flawil1 | 733568 | 252663 | 1057 | 19.06.2019 | M.m | 1 | 94 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.056136299 | 0.0566145 | 0.0139407 | 0.0140601 | 0.0140576 | 0.0141772 | 96.9 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 310a | Flawil1 | 733206 | 252862 | 1063 | 19.06.2019 | M.m | 0 | 328 | 275 | 1 | 1 | 1 | 2 | 2 | 1.4 | yes | yes | 0.00534409 | 0.0054568 | 0.00134243 | 0.00137562 | 0.00134818 | 0.00140177 | 307.1 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 311a | Flawil1 | 733591 | 252527 | 1032 | 19.06.2019 | M.m | 0 | 188 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.010193 | 0.0101664 | 0.00250472 | 0.0024981 | 0.00255901 | 0.00255236 | 11.3 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | Mic hung loosely towards ground |
| 312a | Flawil1 | 733423 | 252941 | 1036 | 19.06.2019 | M.m | 1 | 271 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0265834 | 0.0269539 | 0.00626556 | 0.00635289 | 0.00672355 | 0.00681766 | 193.7 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 313a | Flawil1 | 733408 | 252357 | 1037 | 19.06.2019 | M.m | 3 | 325 | 275 | 3 | 3 | 5 | 3 | 2 | 3.2 | yes | yes | 0.0203584 | 0.0169078 | 0.0116269 | 0.00963765 | 0.025388701 | 0.020941701 | 193.9 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 314a | Flawil1 | 733657 | 252837 | 1249 | 19.06.2019 | M.m | 0 | 244 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.0185603 | 0.0200343 | 0.0046851 | 0.00506027 | 0.00475984 | 0.00514437 | 170.6 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 315a | Flawil1 | 733833 | 252818 | 1061 | 19.06.2019 | M.m | 0 | 386 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | yes | 0.00414227 | 0.094037697 | 0.000605611 | 0.0177618 | 0.00119773 | 0.0248843 | 14.1 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 316a | Flawil1 | 733654 | 252641 | 1073 | 19.06.2019 | M.m | 2 | 182 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.0153351 | 0.0155551 | 0.00394102 | 0.00401814 | 0.00397337 | 0.00405112 | 58.0 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 317a | Flawil1 | 733323 | 252668 | 1074 | 19.06.2019 | M.m | 0 | 152 | 275 | 1 | 3 | 2 | 1 | 1 | 1.6 | yes | no | 0.0126994 | 0.0128939 | 0.00330984 | 0.00336066 | 0.0034218 | 0.00347226 | 128.7 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 318a | Flawil1 | 733514 | 252451 | 3314 | 19.06.2019 | M.m | 3 | 227 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00943343 | 0.0103051 | 0.00156338 | 0.00254941 | 0.00232491 | 0.00372201 | 58.2 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 319a | Flawil1 | 733638 | 252411 | 1048 | 19.06.2019 | M.m | 0 | 310 | 275 | 0.5 | 0 | 0 | 0 | 0.5 | 0.2 | no | no | 0.00125622 | 0.00126555 | 0.000577879 | 0.000585249 | 0.000844561 | 0.000855869 | 110.7 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 320a | Flawil1 | 733555 | 252990 | 1075 | 19.06.2019 | M.m | 0 | 325 | 275 | 0 | 0 | 0 | 0 | 0 | 0 | no | no | 0.00377771 | 0.00377397 | 0.000914029 | 0.000920829 | 0.000980165 | 0.000986885 | 82.3 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 321a | Flawil1 | 733031 | 252534 | 1029 | 19.06.2019 | M.m | 0 | 466 | 275 | 1 | 1 | 11 | 1 | 1 | 3 | yes | no | 0.00145064 | 0.00148091 | 0.000576334 | 0.000590877 | 0.000755099 | 0.000775173 | 432.8 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 322a | Flawil1 | 733399 | 252666 | 1056 | 19.06.2019 | M.m | 1 | 77 | 275 | 1 | 1 | 1 | 2 | 1 | 1.2 | yes | no | 0.034150001 | 0.035106499 | 0.00836888 | 0.00856437 | 0.00850649 | 0.00870585 | 52.7 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |
| 323a | Flawil1 | 733150 | 252897 | 1031 | 19.06.2019 | M.m | 0 | 394 | 275 | 3 | 2 | 3 | 3 | 7 | 3.6 | yes | no | 0.00380405 | 0.00384613 | 0.000847061 | 0.000855607 | 0.00097703 | 0.000987803 | 290.3 | Bischofszell | 9.8 | 17.7 | 91 | 3.9 | 2.3 | |

# Appendix II

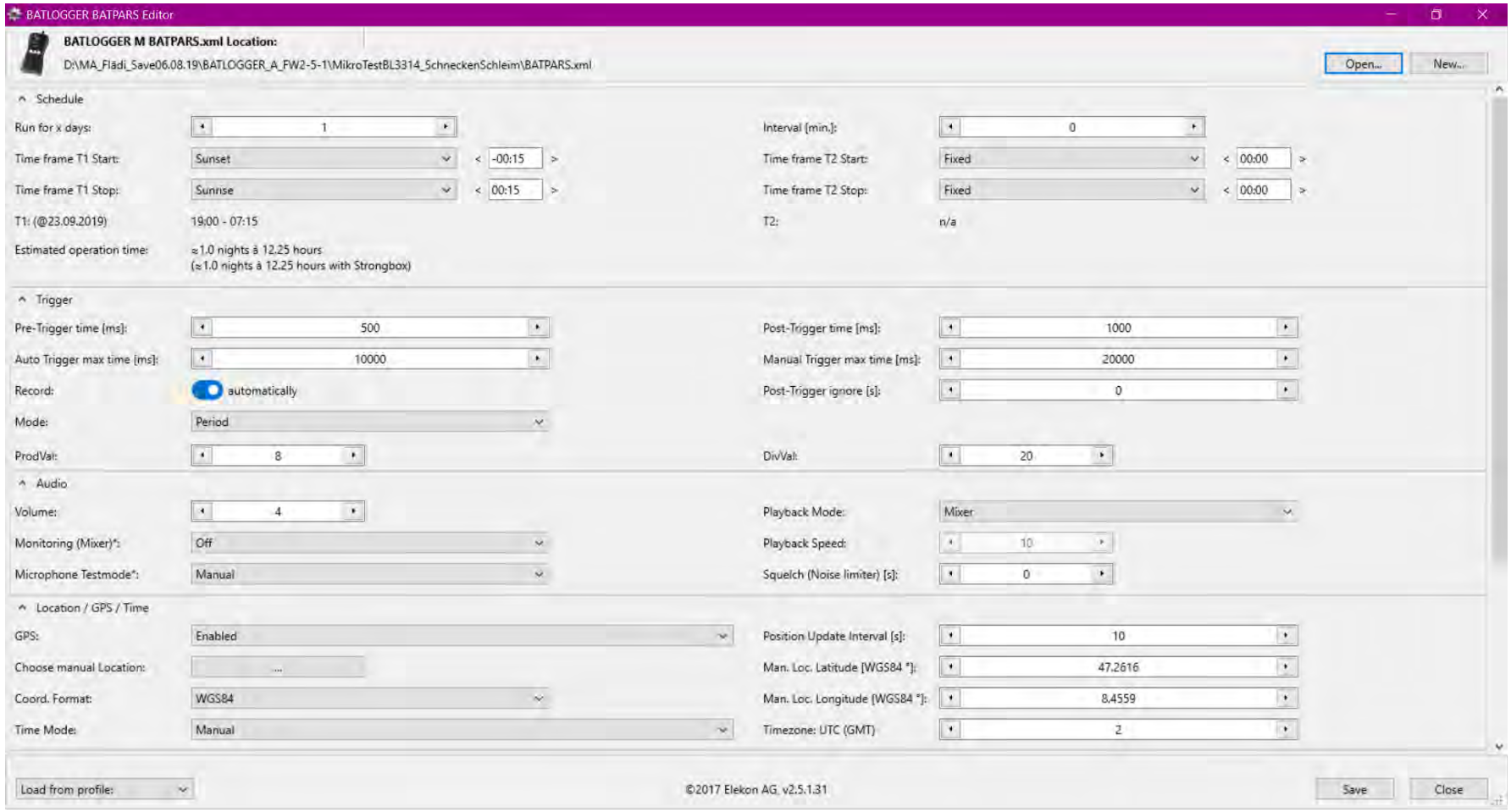


**Figure 10: Setting of the Batlogger M for bat activity recording**

# Appendix III

**Table 15: Filter queries applied to verify *M. myotis* calls**

| Level on BatScope | Sequence | Sequence | Sequence | Calls | Sequence | Calls | Calls | Calls | Calls | Sequence | Calls | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Filter** | **Auto_Class 1st Taxon** | **Auto_Class 2nd Taxon** | **Auto_Class 3rd Taxon** | **MLS** | **Taxon all** | **FreqPeakFIL** | **95% CI-Test** | **#Agreeing Classifier** | **Confidence** | **Status** | **Call** | **Result** |
| **1** | | | | MMY | | | pass | | ≥ 0.75 | | | MY |
| **2** | | | | MMY | | < 20 | fail | | < 0.2 | | | disable |
| **3** | | | | | not MMY | > 45 | pass | | ≥ 0.5 | | | disable |
| **4** | MMY | | | MMY | | | pass | | | | | MMY |
| **5** | N.leisleri or Eptesicus sp. or Verspertilio sp. | MMY | MMY | MMY | | ≥ 30 | | | | | | MMY |
| **6** | E. nilssonii | | | MMY | | | pass | ≥ 4 | | enable | selected | MMY |
| **7** | E. serotinus | | | MMY | | | pass | ≥ 4 | | enable | selected | MMY |
| **8** | N. leisleri | | | MMY | | | pass | ≥ 4 | | enable | selected | MMY |
| **9** | | MMY | | MMY | | | pass | | (≥ 0.75) | enable | | MMY |
| **10** | | | MMY | MMY | | | pass | | (≥ 0.75) | enable | | MMY |
| **11** | | | | N.leisleri | | ≥ 30 | fail | | (≤ 0.5) | enable | | check for MMY |
| **12** | | | | E.nilssonii | | ≥ 30 | fail | | (≤ 0.5) | enable | | check for MMY |
| **13** | | | | E.serotinus | | ≥ 30 | fail | | (≤ 0.5) | enable | | check for MMY |
| **14** | M. daubentonii | MMY | | | | | | | | enable | | check for MMY |
| **15** | M. daubentonii | | MMY | | | | | | | enable | | check for MMY |
| **16** | M. bechsteinii | MMY | | | | | | | | enable | | check for MMY |
| **17** | M. bechsteinii | | MMY | | | | | | | enable | | check for MMY |

# Appendix IV

1) Correlation coefficient matrix of explanatory variables for *M. myotis*

2) Correlation coefficient matrix of explanatory variables for *R. hipposideros*

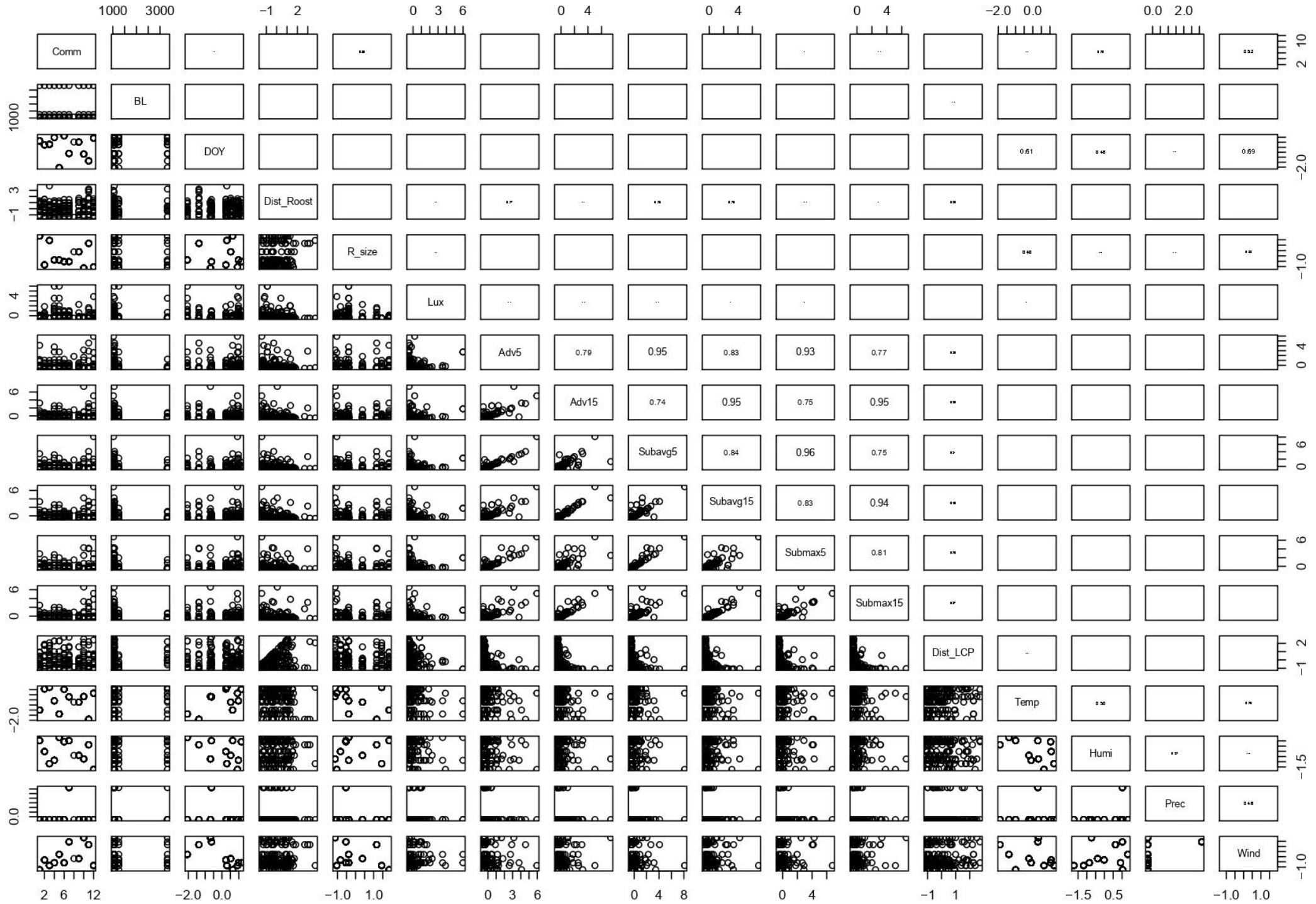


**Figure 11: Correlation coefficient matrix of explanatory variables for *M. myotis***

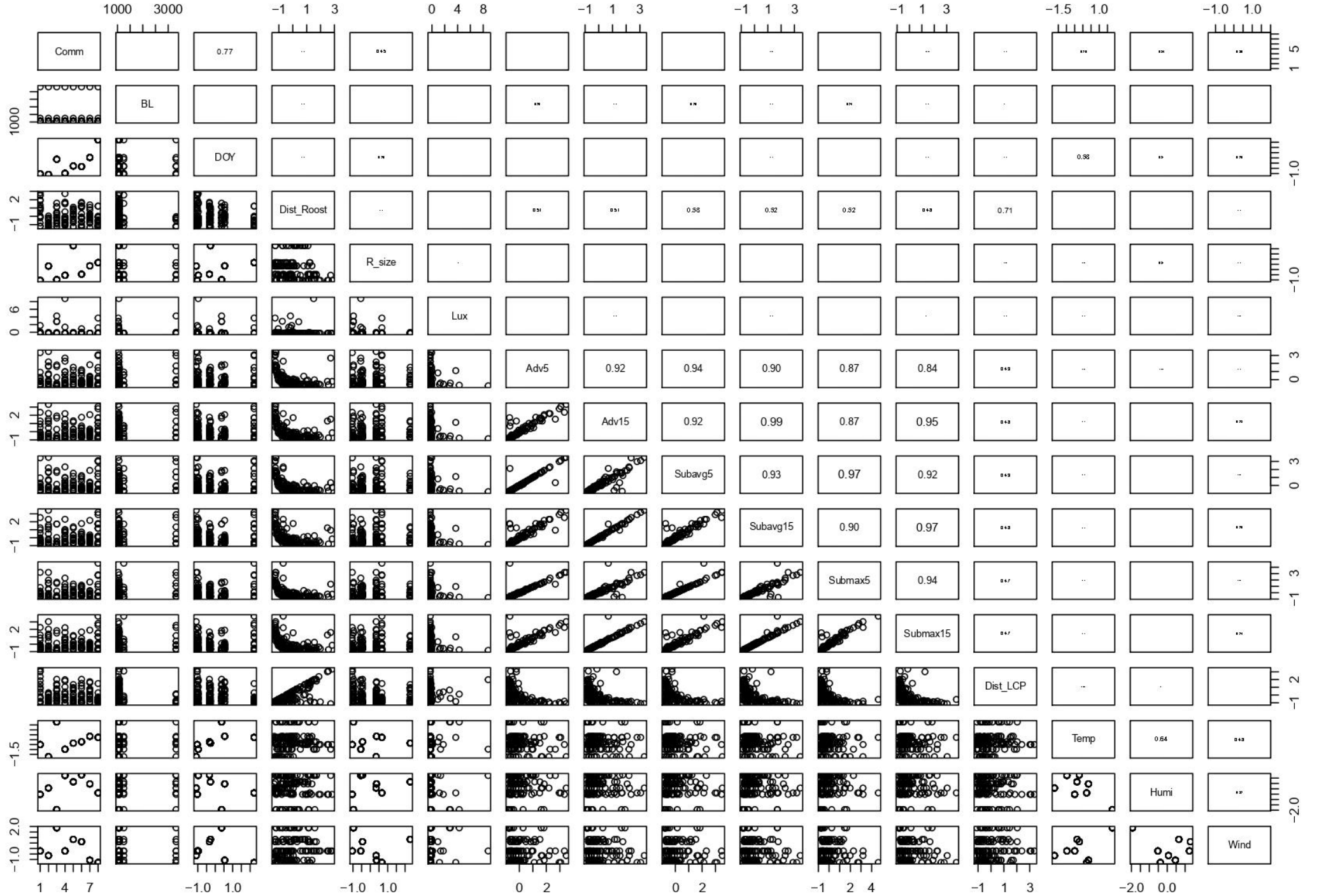


**Figure 12: Correlation coefficient matrix of explanatory variables for *R. hipposideros***

# Appendix V

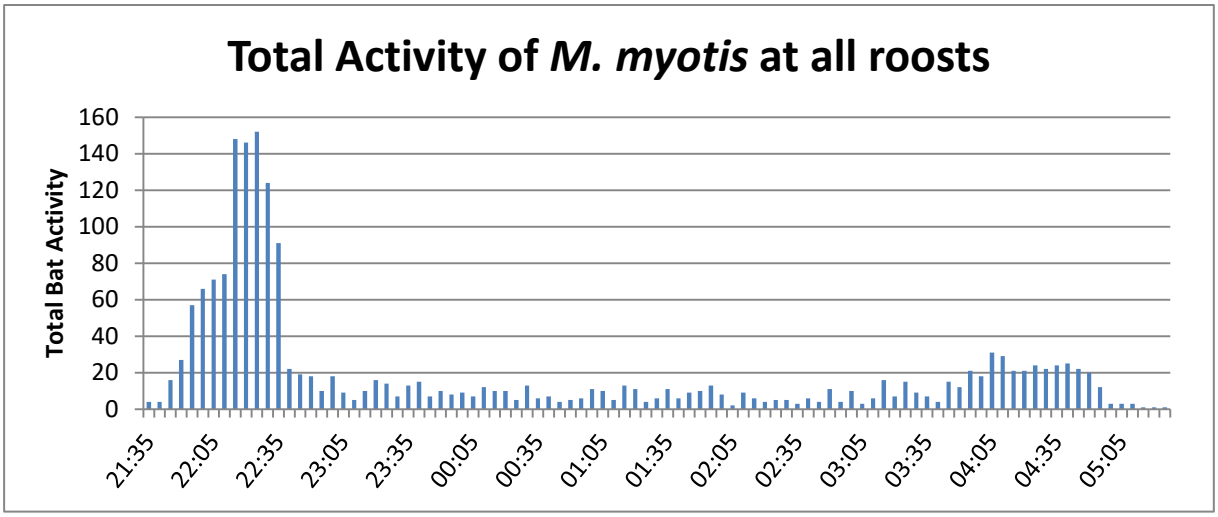


**Figure 13: Distribution of total activity of *M. myotis* at all *M. myotis* study sites**

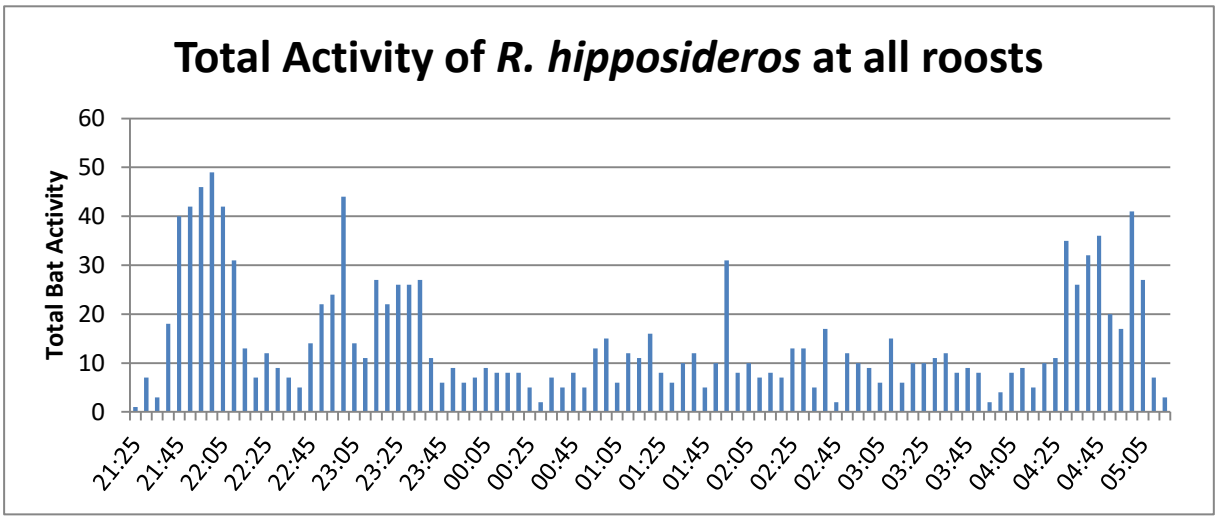


**Figure 14: Distribution of total activity of *R. hipposideros* at all *R. hipposideros* study sites.**

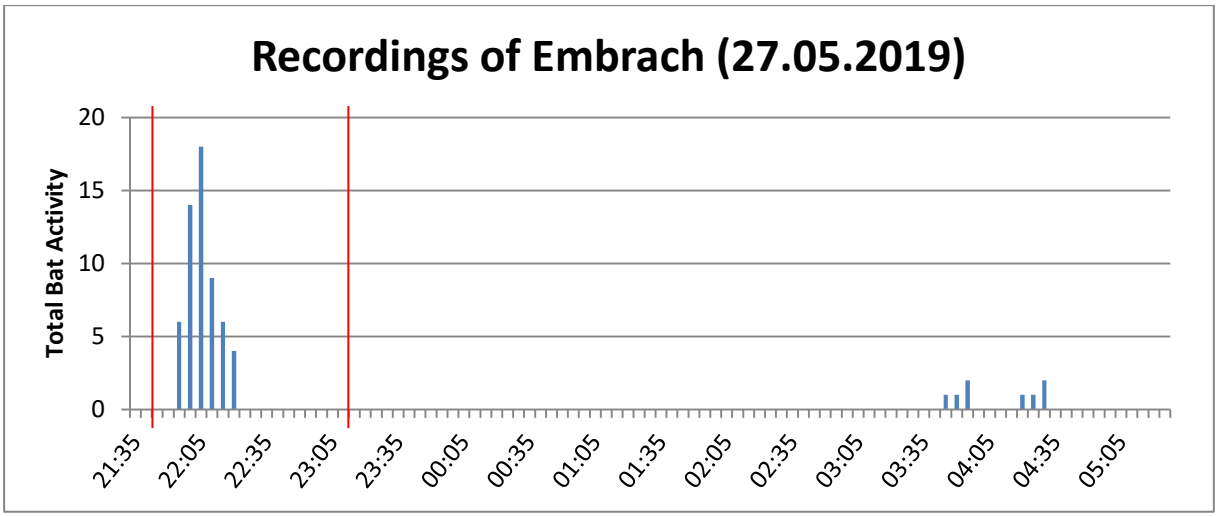


**Figure 15: Distribution of total activity of *M. myotis* in Embrach during the first recording. Start and end time of 'fly-out' period in red.**

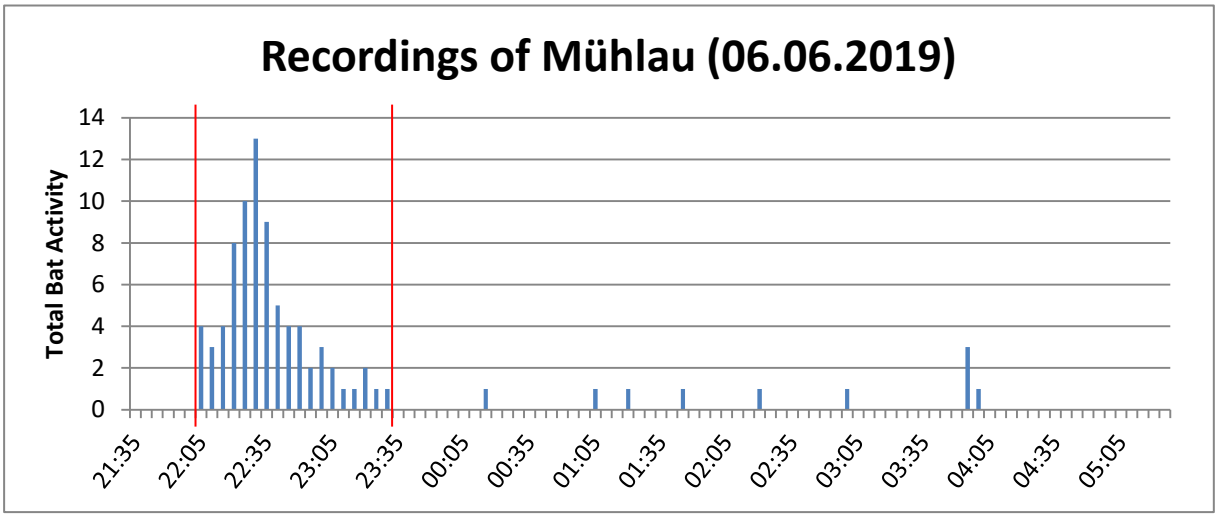


**Figure 16: Distribution of total activity of *M. myotis* in Embrach. Start and end time of 'fly-out' period in red.**

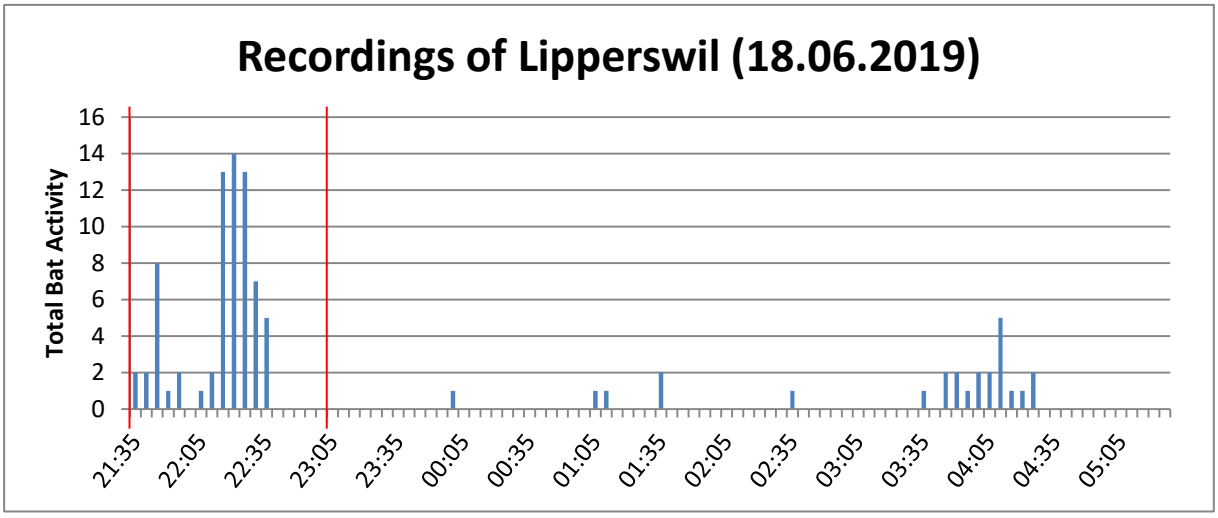


**Figure 17: Distribution of total activity of *M. myotis* in Lipperswil. Start and end time of 'fly-out' period in red.**

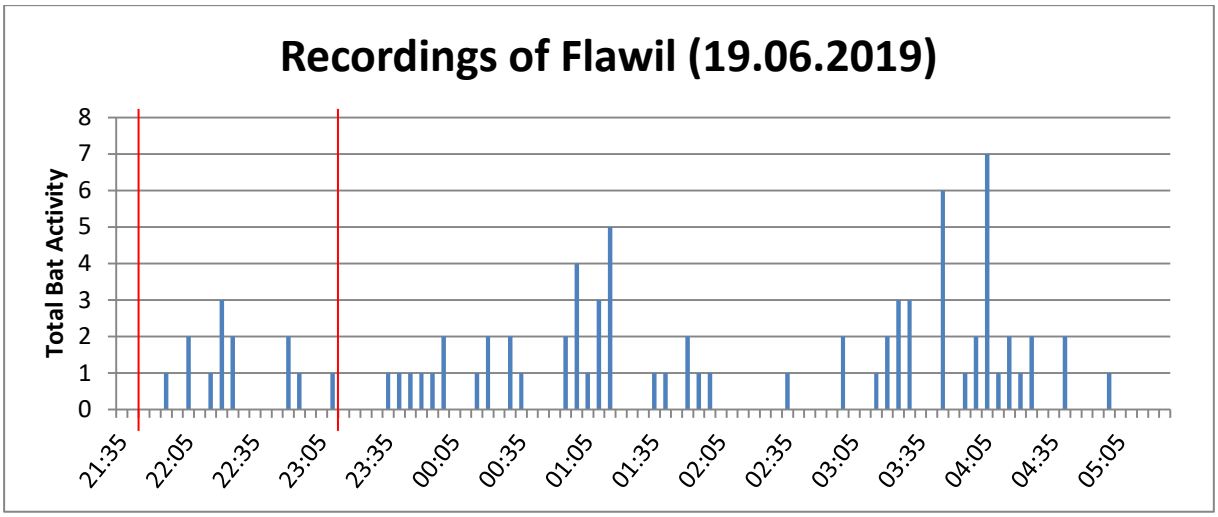


**Figure 18: Distribution of total activity of *M. myotis* in Flawil during the first recording. Start and end time of 'fly-out' period in red.**

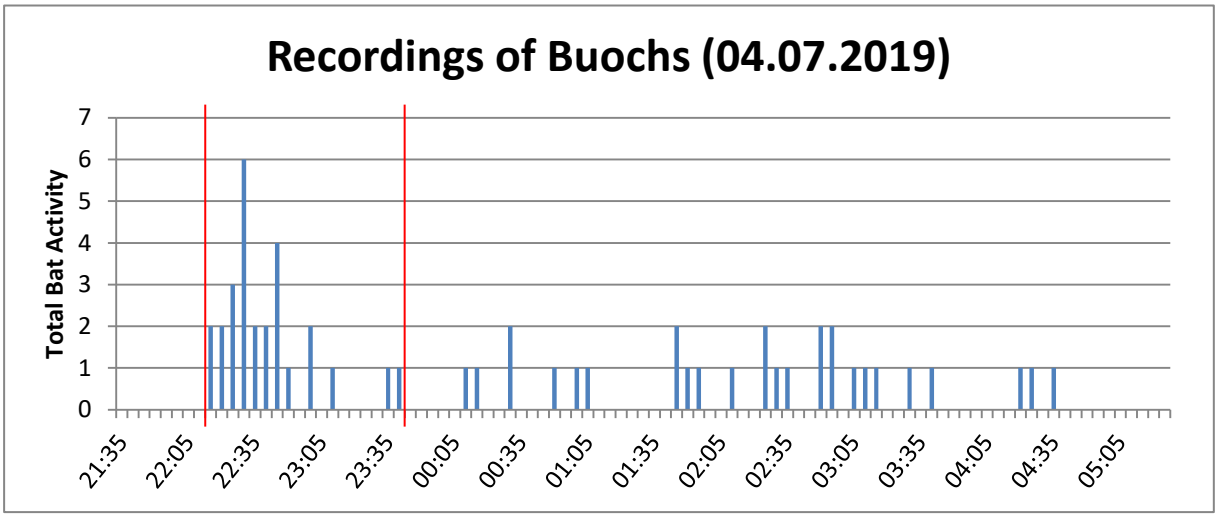


**Figure 19: Distribution of total activity of *M. myotis* in Buochs. Start and end time of 'fly-out' period in red.**

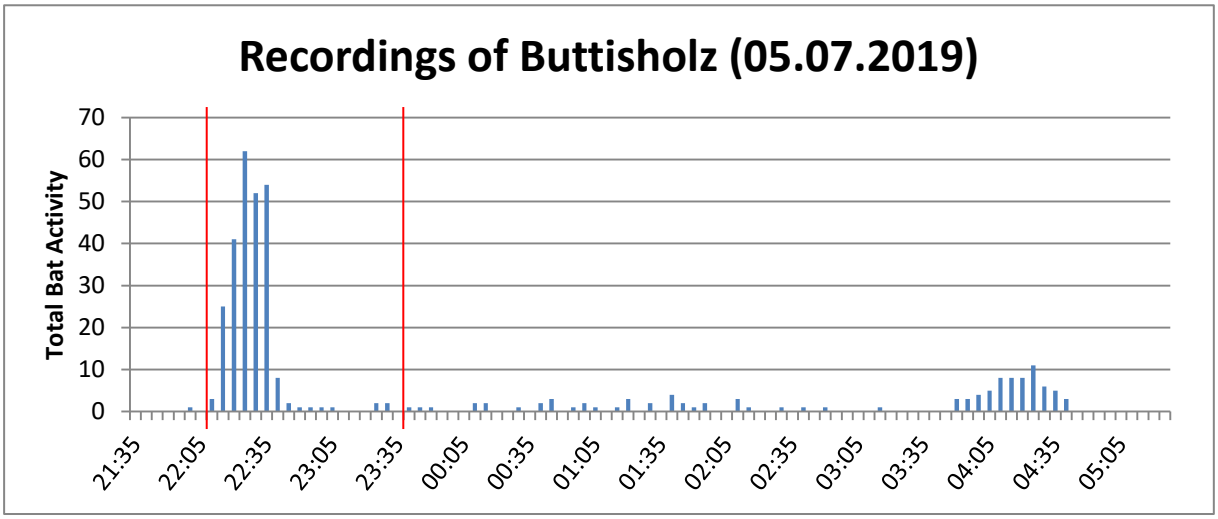


**Figure 20: Distribution of total activity of *M. myotis* in Buttisholz. Start and end time of 'fly-out' period in red.**

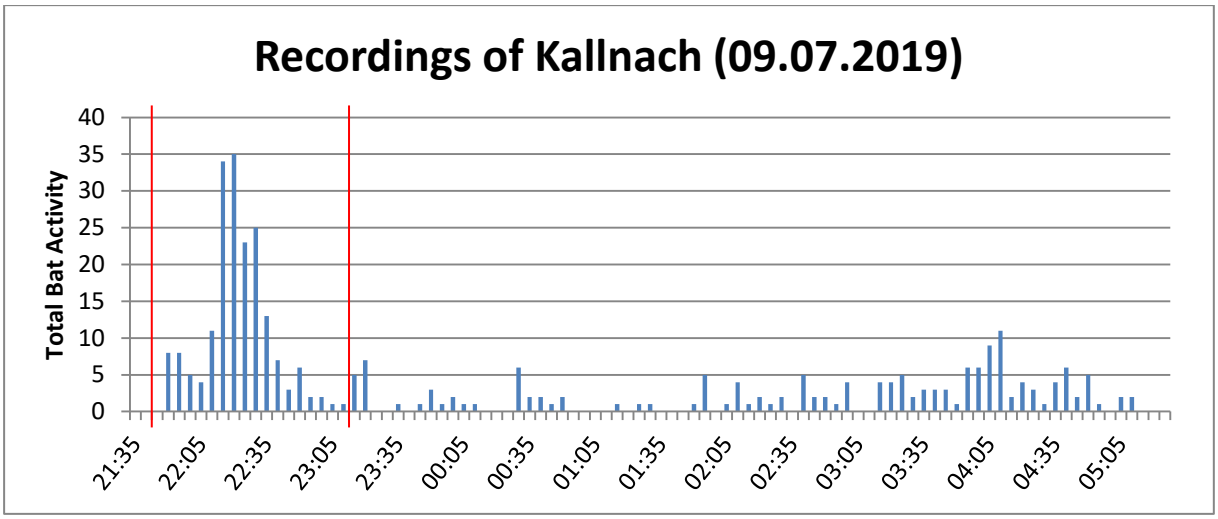


**Figure 21: Distribution of total activity of *M. myotis* in Kallnach. Start and end time of 'fly-out' period in red.**

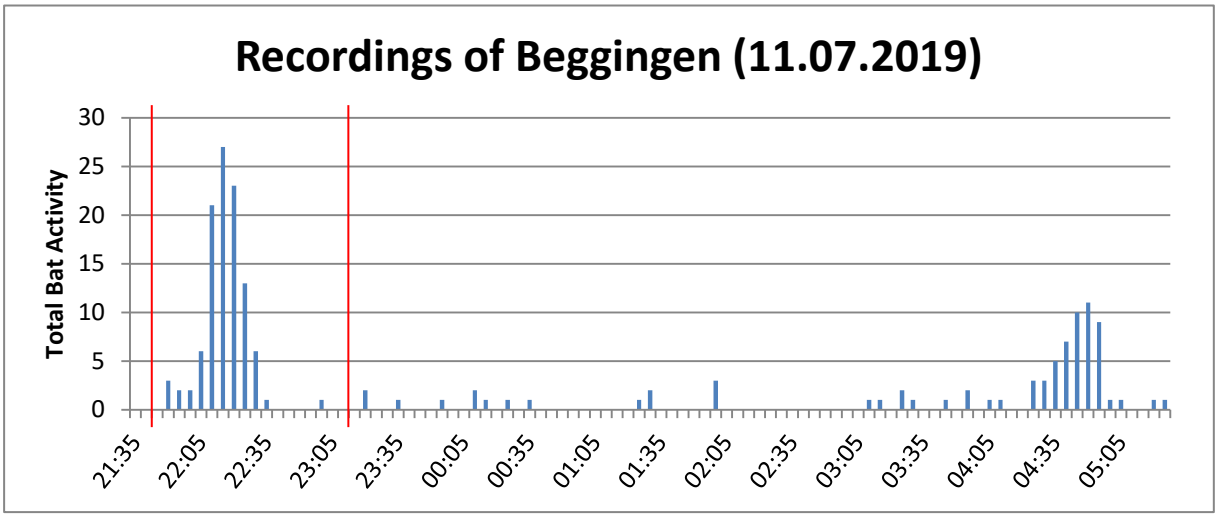


**Figure 22: Distribution of total activity of *M. myotis* in Beggingen. Start and end time of 'fly-out' period in red.**

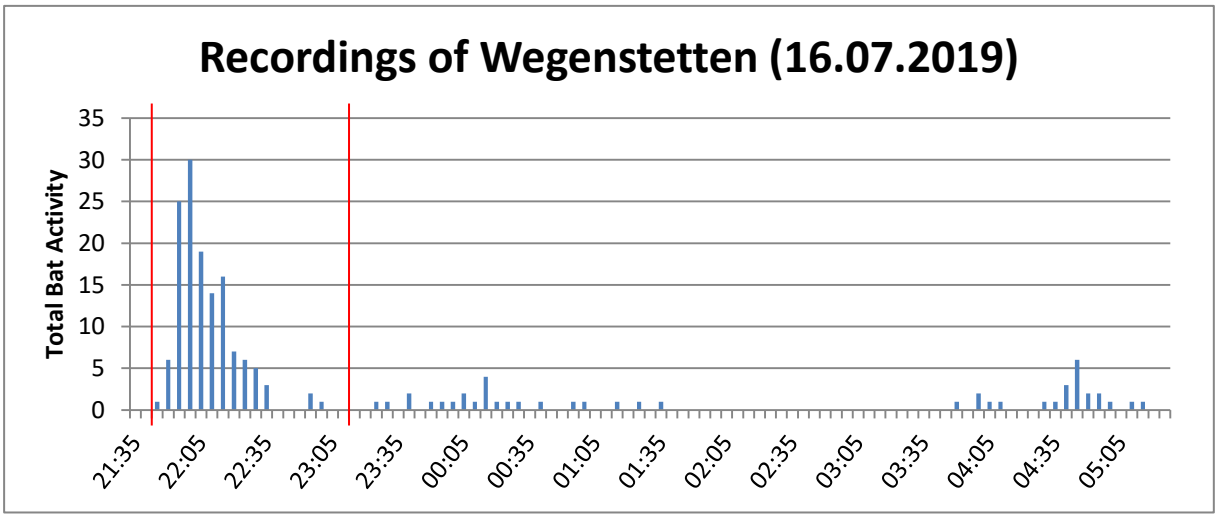


**Figure 23: Distribution of total activity of *M. myotis* in Wegenstetten. Start and end time of 'fly-out' period in red.**

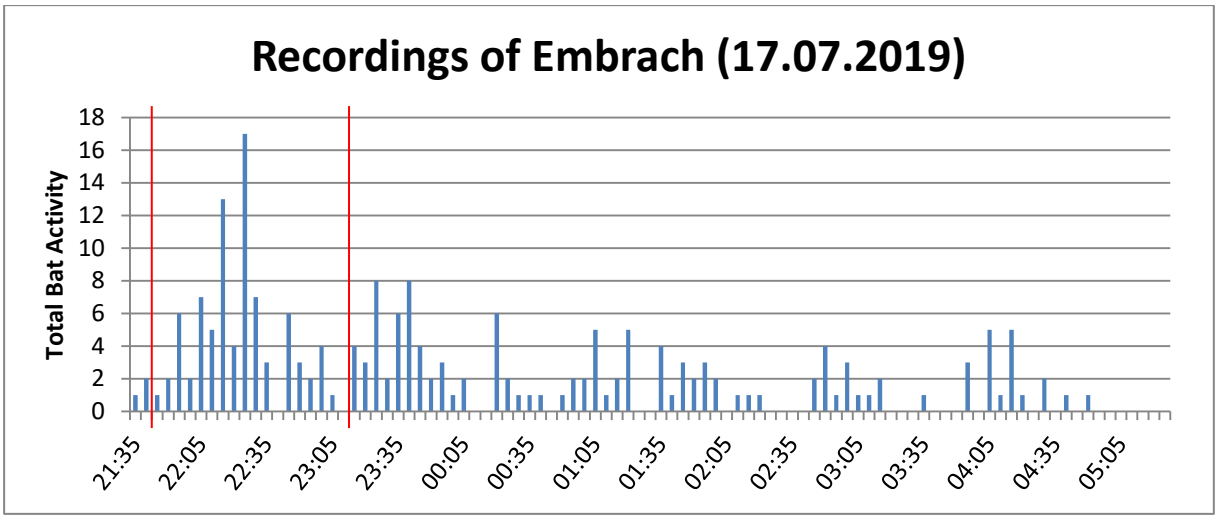


**Figure 24: Distribution of total activity of *M. myotis* in Embrach during the second recording. Start and end time of 'fly-out' period in red.**

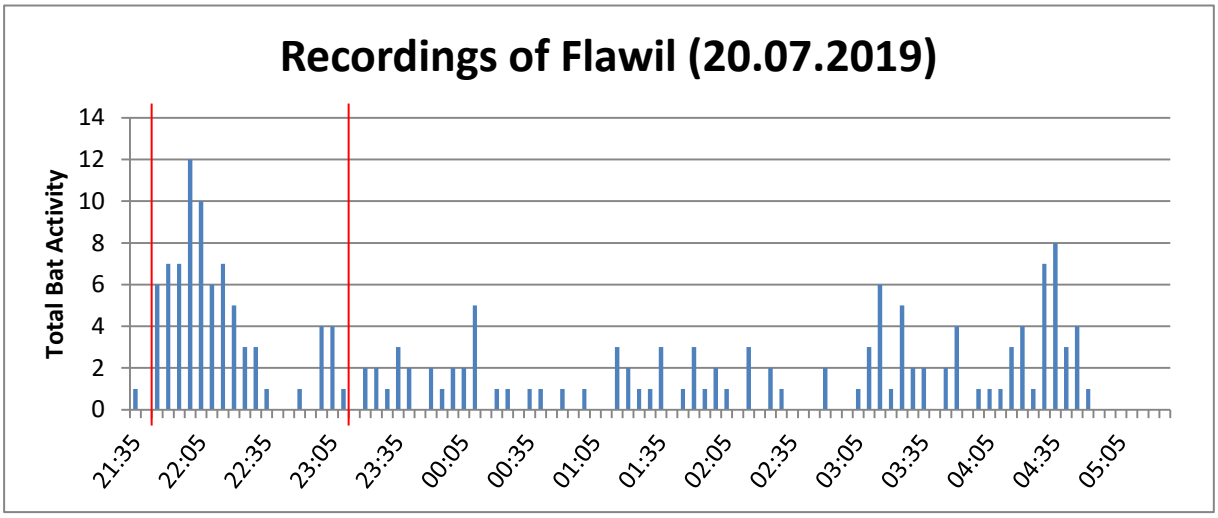


**Figure 25: Distribution of total activity of *M. myotis* in Flawil during the second recording. Start and end time of 'fly-out' period in red.**

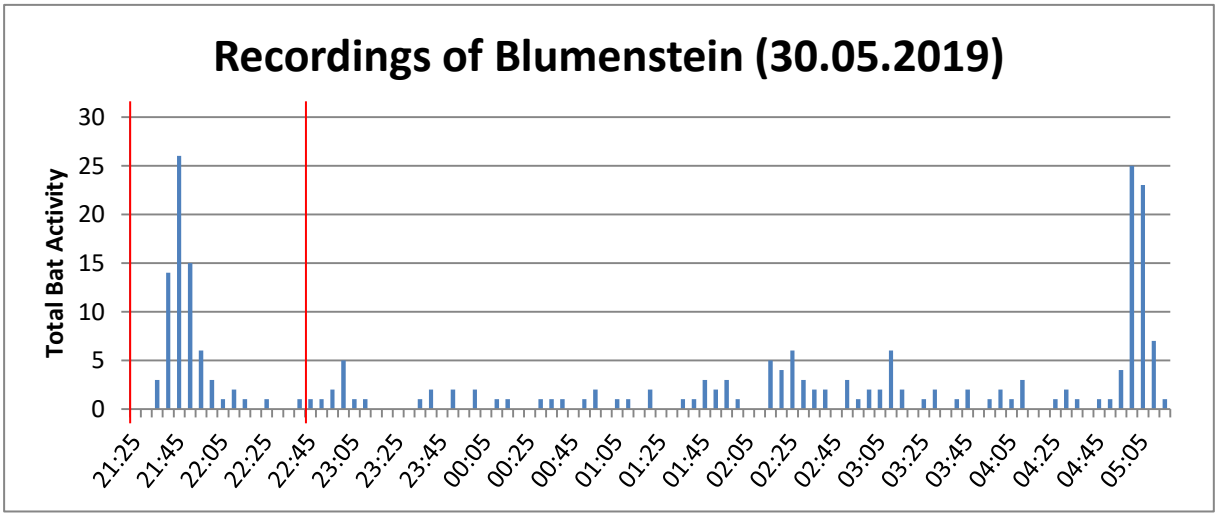


**Figure 26: Distribution of total activity of *R. hipposideros* in Blumenstein. Start and end time of 'fly-out' period in red.**

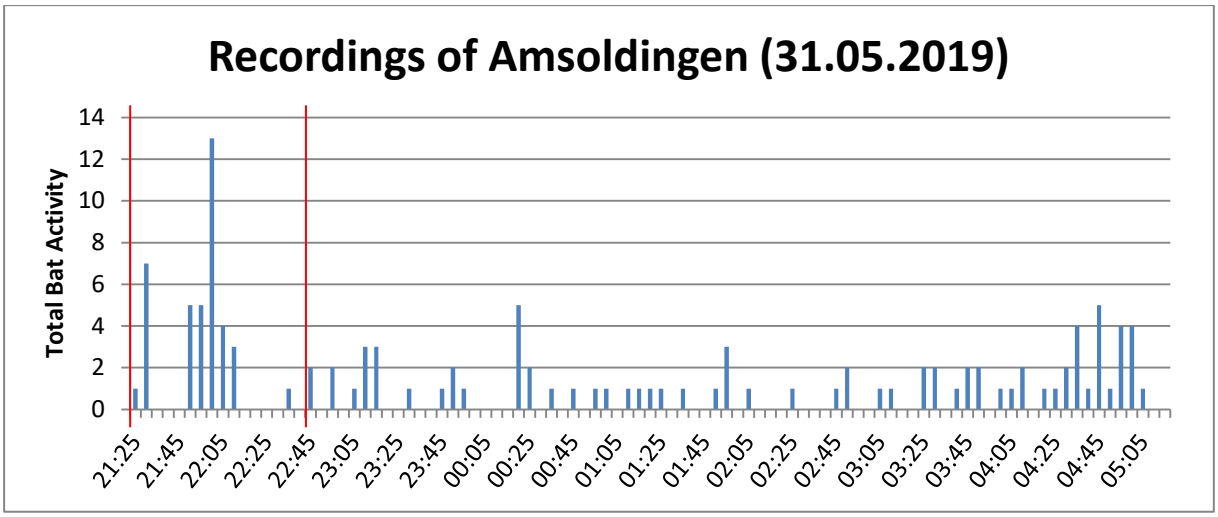


**Figure 27: Distribution of total activity of *R. hipposideros* in Amsoldingen. Start and end time of 'fly-out' period in red.**

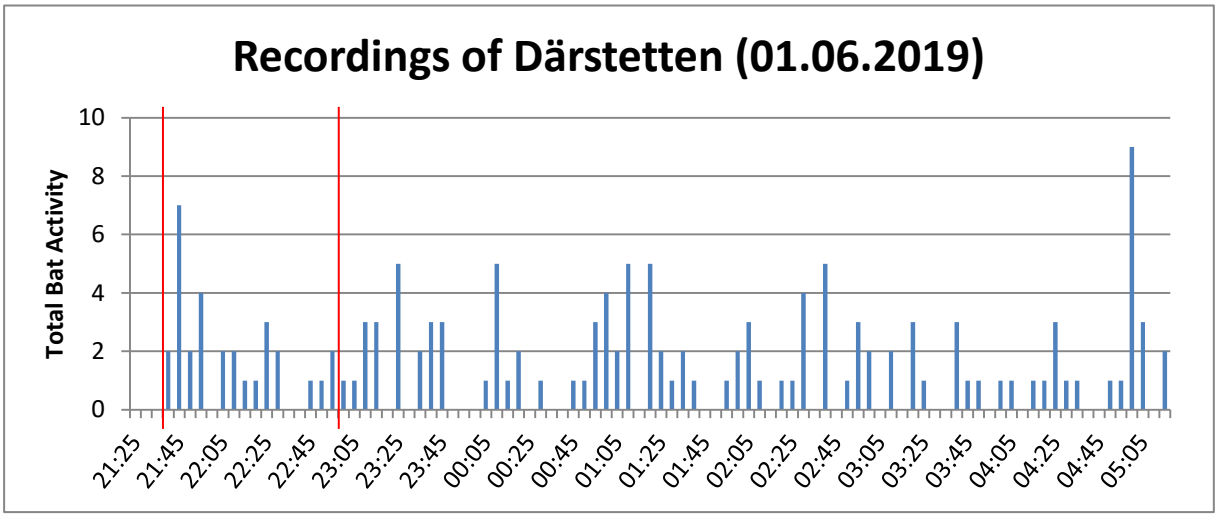


**Figure 28: Distribution of total activity of *R. hipposideros* in Därstetten. Start and end time of 'fly-out' period in red.**

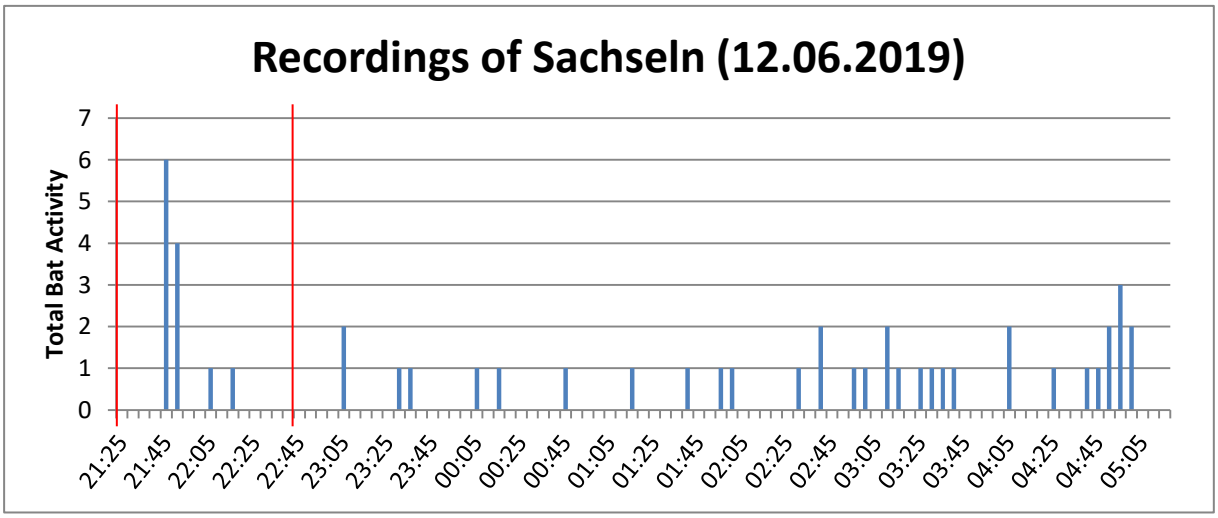


**Figure 29: Distribution of total activity of *R. hipposideros* in Sachseln. Start and end time of 'fly-out' period in red.**

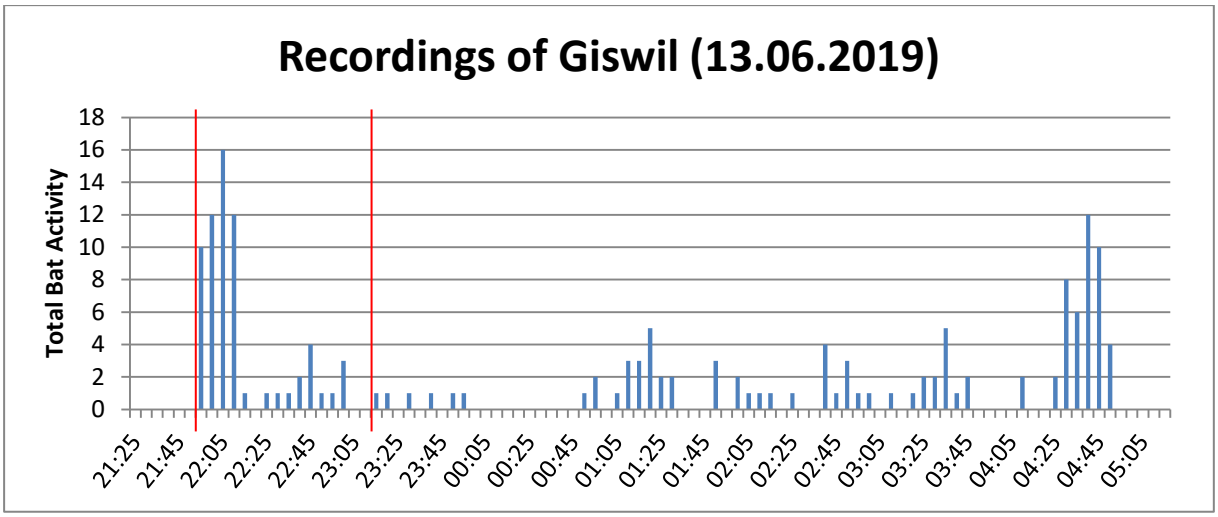


**Figure 30: Distribution of total activity of *R. hipposideros* in Giswil. Start and end time of 'fly-out' period in red.**

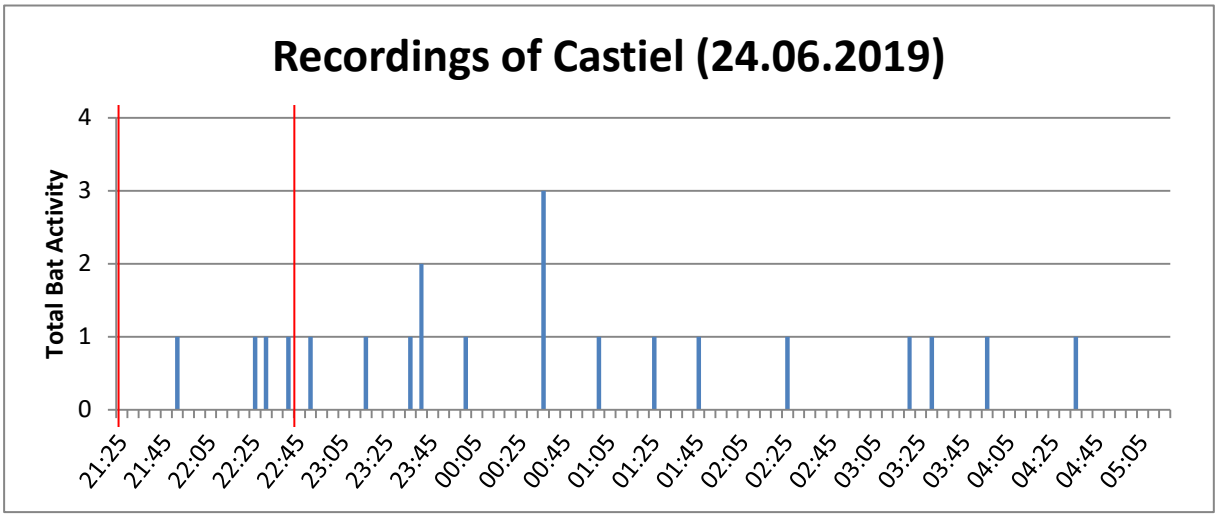


**Figure 31: Distribution of total activity of *R. hipposideros* in Castiel. Start and end time of 'fly-out' period in red.**

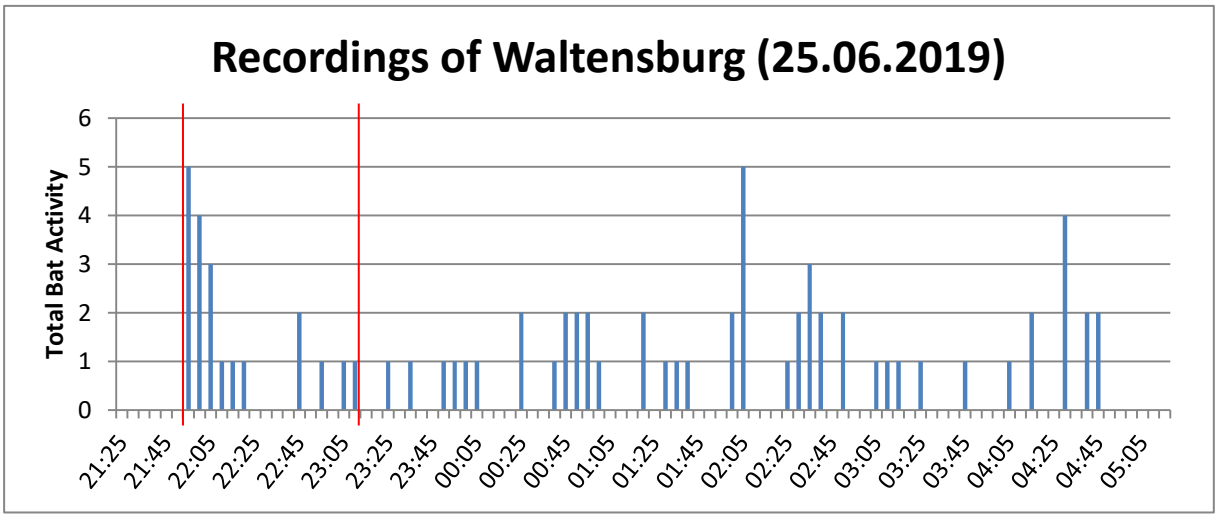


**Figure 32: Distribution of total activity of *R. hipposideros* in Waltensburg. Start and end time of 'fly-out' period in red.**

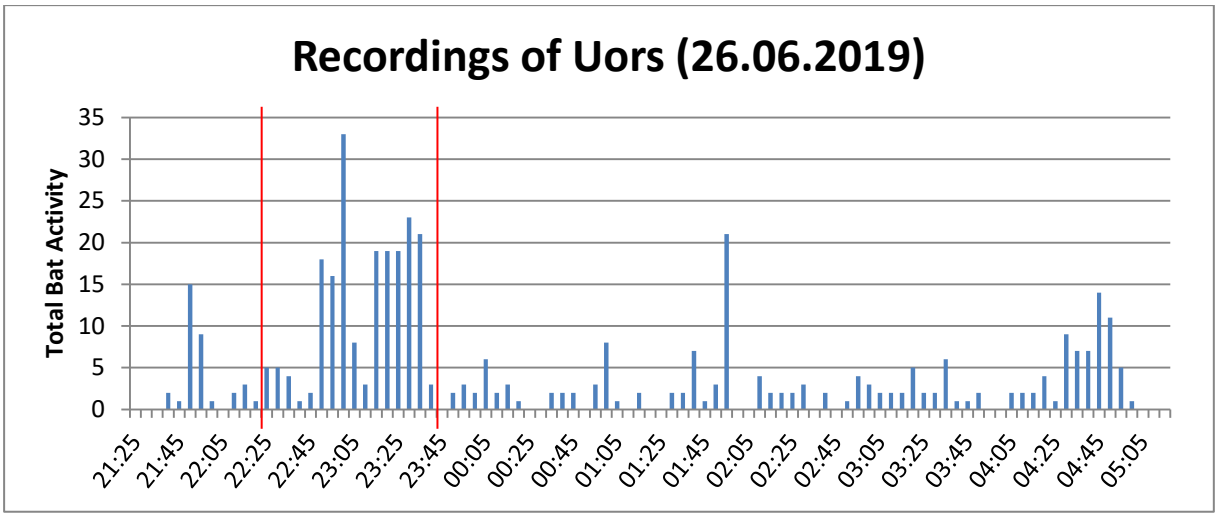


**Figure 33: Distribution of total activity of *R. hipposideros* in Uors. Start and end time of 'fly-out' period in red.**

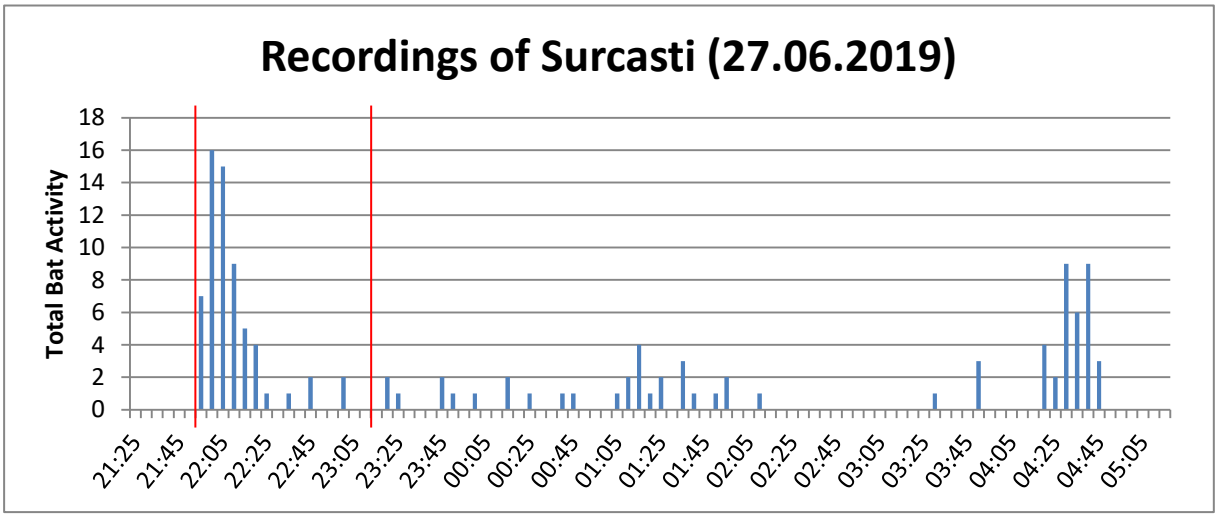


**Figure 34: Distribution of total activity of *R. hipposideros* in Surcasti. Start and end time of 'fly-out' period in red.**

# Appendix VI

**Table 16: Full model ranking list for *M. myotis* data with Adv15 variable included.**

| rank | Adv15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.530 |
| 2 | -0.052 | -0.428 | -0.216 | -0.399 | 10 | -848.930 | 1719.209 | 0.237 | 0.470 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 5.85e-8 |
| 4 | -0.011 | -0.483 | - | -0.383 | 9 | -867.020 | 1753.138 | 34.165 | 2.02e-8 |
| 5 | - | -0.400 | -0.196 | - | 8 | -876.329 | 1769.531 | 50.558 | 5.56e-12 |
| 6 | -0.054 | -0.423 | -0.207 | - | 9 | -875.264 | 1769.627 | 50.654 | 5.30e-12 |
| 7 | - | -0.469 | - | - | 7 | -891.846 | 1798.366 | 79.393 | 3.05e-18 |
| 8 | -0.015 | -0.476 | - | - | 8 | -891.755 | 1800.383 | 81.410 | 1.11e-18 |
| 9 | 0.079 | - | -0.307 | -0.392 | 9 | -896.803 | 1812.704 | 93.731 | 2.35e-21 |
| 10 | - | - | -0.335 | -0.394 | 8 | -899.344 | 1815.560 | 96.587 | 5.63e-22 |
| 11 | 0.075 | - | -0.298 | - | 8 | -920.728 | 1858.329 | 139.356 | 2.90e-31 |
| 12 | - | - | -0.323 | - | 7 | -922.981 | 1860.636 | 141.664 | 9.16e-32 |
| 13 | 0.164 | - | - | -0.364 | 8 | -937.123 | 1891.119 | 172.146 | 2.20e-38 |
| 14 | - | - | - | -0.362 | 7 | -950.651 | 1915.976 | 197.003 | 8.81e-44 |
| 15 | 0.158 | - | - | - | 7 | -957.988 | 1930.651 | 211.678 | 5.74e-47 |
| 16 | - | - | - | - | 6 | -970.250 | 1953.003 | 234.030 | 8.03e-52 |

**Table 17: Full model ranking list for *M. myotis* data with Subavg15 variable included.**

| rank | Subavg15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.609 |
| 2 | -0.043 | -0.426 | -0.214 | -0.397 | 10 | -849.255 | 1719.860 | 0.888 | 0.391 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 6.73e-8 |
| 4 | 0.001 | -0.477 |  | -0.383 | 9 | -867.068 | 1753.233 | 34.260 | 2.21e-8 |
| 5 | - | -0.400 | -0.196 | - | 8 | -876.329 | 1769.531 | 50.558 | 6.40e-12 |
| 6 | -0.050 | -0.422 | -0.207 | - | 9 | -875.457 | 1770.012 | 51.039 | 5.03e-12 |
| 7 | - | -0.469 | - | - | 7 | -891.846 | 1798.366 | 79.393 | 3.50e-18 |
| 8 | -0.007 | -0.472 | - | - | 8 | -891.826 | 1800.525 | 81.552 | 1.19e-18 |
| 9 | 0.091 | - | -0.301 | -0.396 | 9 | -895.869 | 1810.836 | 91.863 | 6.87e-21 |
| 10 | - | - | -0.335 | -0.394 | 8 | -899.344 | 1815.560 | 96.587 | 6.47e-22 |
| 11 | 0.084 | - | -0.293 | - | 8 | -920.150 | 1857.173 | 138.201 | 5.95e-31 |
| 12 | - | - | -0.323 | - | 7 | -922.981 | 1860.636 | 141.664 | 1.05e-31 |
| 13 | 0.185 | - | - | -0.373 | 8 | -933.927 | 1884.727 | 165.754 | 6.19e-37 |
| 14 | - | - | - | -0.362 | 7 | -950.651 | 1915.976 | 197.003 | 1.01e-43 |
| 15 | 0.175 | - | - | - | 7 | -955.632 | 1925.939 | 206.966 | 6.96e-46 |
| 16 | - | - | - | - | 6 | -970.250 | 1953.003 | 234.030 | 9.24e-52 |

**Table 18: Full model ranking list of *M. myotis* data with Submax15 variable included.**

| rank | Submax15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | - | -0.406 | -0.205 | -0.397 | 9 | -849.938 | 1718.973 | 0.000 | 0.586 |
| 2 | -0.047 | -0.428 | -0.208 | -0.397 | 10 | -849.159 | 1719.668 | 0.695 | 0.414 |
| 3 | - | -0.478 | - | -0.383 | 8 | -867.068 | 1751.009 | 32.036 | 6.48e-8 |
| 4 | -0.035 | -0.494 | - | -0.383 | 9 | -866.599 | 1752.296 | 33.324 | 3.40e-8 |
| 5 | - | -0.400 | -0.196 | - | 8 | -876.329 | 1769.531 | 50.558 | 6.16e-12 |
| 6 | -0.051 | -0.423 | -0.199 | - | 9 | -875.416 | 1769.930 | 50.957 | 5.04e-12 |
| 7 | - | -0.469 | - | - | 7 | -891.846 | 1798.366 | 79.393 | 3.37e-18 |
| 8 | -0.040 | -0.488 | - | - | 8 | -891.247 | 1799.366 | 80.394 | 2.05e-18 |
| 9 | 0.096 | - | -0.313 | -0.396 | 9 | -895.616 | 1810.330 | 91.358 | 8.51e-21 |
| 10 | - | - | -0.335 | -0.394 | 8 | -899.344 | 1815.560 | 96.587 | 6.23e-22 |
| 11 | 0.090 | - | -0.303 | - | 8 | -919.817 | 1856.507 | 137.534 | 7.99e-31 |
| 12 | - | - | -0.323 | - | 7 | -922.981 | 1860.636 | 141.664 | 1.01e-31 |
| 13 | 0.152 | - | - | -0.368 | 8 | -939.860 | 1896.592 | 177.620 | 1.58e-39 |
| 14 | - | - | - | -0.362 | 7 | -950.651 | 1915.976 | 197.003 | 9.76e-44 |
| 15 | 0.145 | - | - | - | 7 | -960.673 | 1936.022 | 217.049 | 4.33e-48 |
| 16 | - | - | - | - | 6 | -970.250 | 1953.003 | 234.030 | 8.89e-52 |

**Table 19: Full model ranking list of *R. hipposideros* data with Adv15 variable included.**

| rank | Adv15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.345 | -0.737 | 0.407 | -15.829 | 8 | -586.655 | 1190.552 | 0.000 | 1.000 |
| 2 | 0.219 | -0.629 | - | -19.435 | 7 | -603.242 | 1221.442 | 30.890 | 1.96e-7 |
| 3 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 41.386 | 1.03e-9 |
| 4 | | -0.832 | | -21.618 | 6 | -613.657 | 1240.026 | 49.474 | 1.81e-11 |
| 5 | 0.455 | | 0.155 | -15.202 | 7 | -632.628 | 1280.214 | 89.662 | 3.39e-20 |
| 6 | 0.398 | | | -16.678 | 6 | -635.235 | 1283.182 | 92.631 | 7.68e-21 |
| 7 | 0.464 | -0.787 | 0.662 | - | 7 | -640.052 | 1295.061 | 104.509 | 2.02e-23 |
| 8 | | | -0.209 | -21.828 | 6 | -676.671 | 1366.053 | 175.502 | 7.77e-39 |
| 9 | | | | -20.390 | 5 | -682.978 | 1376.460 | 185.909 | 4.27e-41 |
| 10 | | -1.136 | 0.428 | | 6 | -682.560 | 1377.831 | 187.279 | 2.15e-41 |
| 11 | 0.284 | -0.580 | | | 6 | -688.784 | 1390.280 | 199.728 | 4.26e-44 |
| 12 | 0.597 | | 0.397 | | 6 | -690.006 | 1392.723 | 202.172 | 1.26e-44 |
| 13 | | -0.916 | | | 5 | -706.602 | 1423.708 | 233.156 | 2.35e-51 |
| 14 | 0.455 | | | | 5 | -710.592 | 1431.687 | 241.136 | 4.35e-53 |
| 15 | | | | | 4 | -777.650 | 1563.633 | 373.081 | 9.69e-82 |
| 16 | | | -0.024 | | 5 | -777.561 | 1565.625 | 375.074 | 3.58e-82 |

**Table 20: Full model ranking list of *R. hipposideros* data with Subavg15 variable included.**

| rank | Subavg15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.322 | -0.761 | 0.418 | -15.826 | 8 | -589.689 | 1196.620 | 0.000 | 1.000 |
| 2 | 0.181 | -0.662 | - | -19.694 | 7 | -606.139 | 1227.235 | 30.615 | 2.25e-7 |
| 3 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 35.318 | 2.14e-8 |
| 4 | - | -0.832 | - | -21.618 | 6 | -613.657 | 1240.026 | 43.406 | 3.75e-10 |
| 5 | 0.426 | - | 0.158 | -15.235 | 7 | -638.641 | 1292.239 | 95.619 | 1.72e-21 |
| 6 | 0.365 | - | - | -16.764 | 6 | -641.112 | 1294.935 | 98.315 | 4.48e-22 |
| 7 | 0.451 | -0.809 | 0.688 | - | 7 | -641.866 | 1298.689 | 102.069 | 6.86e-23 |
| 8 | - | - | -0.209 | -21.828 | 6 | -676.671 | 1366.053 | 169.433 | 1.61e-37 |
| 9 | - | - | - | -20.390 | 5 | -682.978 | 1376.460 | 179.840 | 8.88e-40 |
| 10 | - | -1.136 | 0.428 | - | 6 | -682.560 | 1377.831 | 181.211 | 4.47e-40 |
| 11 | 0.249 | -0.617 | - | - | 6 | -692.002 | 1396.716 | 200.096 | 3.55e-44 |
| 12 | 0.578 | - | 0.415 | - | 6 | -695.206 | 1403.124 | 206.504 | 1.44e-45 |
| 13 | - | -0.916 | - | - | 5 | -706.602 | 1423.708 | 227.088 | 4.88e-50 |
| 14 | 0.424 | - | - | - | 5 | -716.309 | 1443.123 | 246.502 | 2.97e-54 |
| 15 | - | - | - | - | 4 | -777.650 | 1563.633 | 367.013 | 2.01e-80 |
| 16 | - | - | -0.024 | - | 5 | -777.561 | 1565.625 | 369.005 | 7.44e-81 |

**Table 21: Full model ranking list of *R. hipposideros* data with Submax15 variable included.**

| rank | Submax15 | Dist_LCP | Dist_ Roost | Lux | df | logLik | AICc | delta | weight |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.163 | -0.854 | 0.301 | -17.816 | 8 | -602.754 | 1222.749 | 0.000 | 0.990 |
| 2 | - | -0.937 | 0.205 | -20.264 | 7 | -608.490 | 1231.938 | 9.189 | 0.010 |
| 3 | 0.081 | -0.765 | - | -20.670 | 7 | -612.043 | 1239.043 | 16.294 | 2.86e-4 |
| 4 | - | -0.832 | | -21.618 | 6 | -613.657 | 1240.026 | 17.278 | 1.75e-4 |
| 5 | 0.254 | - | - | -17.428 | 6 | -661.057 | 1334.827 | 112.078 | 4.55e-25 |
| 6 | 0.251 | - | -0.011 | -17.534 | 7 | -661.045 | 1337.048 | 114.299 | 1.50e-25 |
| 7 | 0.295 | -0.928 | 0.570 | - | 7 | -662.217 | 1339.390 | 116.642 | 4.65e-26 |
| 8 | - | - | -0.209 | -21.828 | 6 | -676.671 | 1366.053 | 143.305 | 7.54e-32 |
| 9 | - | - | - | -20.390 | 5 | -682.978 | 1376.460 | 153.712 | 4.14e-34 |
| 10 | - | -1.136 | 0.428 | - | 6 | -682.560 | 1377.831 | 155.082 | 2.09e-34 |
| 11 | 0.167 | -0.737 | - | - | 6 | -699.577 | 1411.866 | 189.117 | 8.49e-42 |
| 12 | - | -0.916 | - | - | 5 | -706.602 | 1423.708 | 200.959 | 2.28e-44 |
| 13 | 0.409 | - | 0.253 | - | 6 | -728.529 | 1469.770 | 247.022 | 2.27e-54 |
| 14 | 0.338 | - | - | - | 5 | -736.941 | 1484.386 | 261.637 | 1.52e-57 |
| 15 | - | - | - | - | 4 | -777.650 | 1563.633 | 340.885 | 9.40e-75 |
| 16 | - | - | -0.024 | - | 5 | -777.561 | 1565.625 | 342.877 | 3.47e-75 |

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

# Eigenständigkeitserklärung

Die unterzeichnete Eigenständigkeitserklärung ist Bestandteil jeder während des Studiums verfassten Semester-, Bachelor- und Master-Arbeit oder anderen Abschlussarbeit (auch der jeweils elektronischen Version).

Die Dozentinnen und Dozenten können auch für andere bei ihnen verfasste schriftliche Arbeiten eine Eigenständigkeitserklärung verlangen.

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Ich bestätige, die vorliegende Arbeit selbständig und in eigenen Worten verfasst zu haben. Davon ausgenommen sind sprachliche und inhaltliche Korrekturvorschläge durch die Betreuer und Betreuerinnen der Arbeit.

**Titel der Arbeit** (in Druckschrift):

Challenging the predictive power of flight corridor models for bats

**Verfasst von** (in Druckschrift):
*Bei Gruppenarbeiten sind die Namen aller Verfasserinnen und Verfasser erforderlich.*

| **Name(n):** | **Vorname(n):** |
|---|---|
| Meier | Tina |
| | |
| | |
| | |
| | |

Ich bestätige mit meiner Unterschrift:
- Ich habe keine im Merkblatt „Zitier-Knigge“ beschriebene Form des Plagiats begangen.
- Ich habe alle Methoden, Daten und Arbeitsabläufe wahrheitsgetreu dokumentiert.
- Ich habe keine Daten manipuliert.
- Ich habe alle Personen erwähnt, welche die Arbeit wesentlich unterstützt haben.

Ich nehme zur Kenntnis, dass die Arbeit mit elektronischen Hilfsmitteln auf Plagiate überprüft werden kann.

| **Ort, Datum** | **Unterschrift(en)** |
|---|---|
| Zürich, 28.10.2019 | T. Meier |
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*Bei Gruppenarbeiten sind die Namen aller Verfasserinnen und Verfasser erforderlich. Durch die Unterschriften bürgen sie gemeinsam für den gesamten Inhalt dieser schriftlichen Arbeit.*