

A Bat Assessment of the Lands at Crodaun, Celbridge, County Kildare Proposed For Development and Implications For Resident and Local Bat Fauna

Brian Keeley B. Sc. (Hons) in Zool.

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Introduction

Most of Ireland's mammals enjoy protection under the Wildlife Act (1976) and the more recent updating of this legislation (Wildlife (Amendment) Act 2000, S.I. No. 94 of 1997, S.I. No. 378 of 2005, European Communities (Natural Habitats) (Amendment) Regulations, 2005). In conjunction with the enactment of the Habitats Directive into Irish legislation, all native mustelid species and bat species are protected with further protection given to otters and lesser horseshoe bats. Lesser horseshoe bats are not found in County Kildare. Bats account for nine of Ireland's terrestrial mammal species, approximately one quarter of the species of the Irish land mass. In Ireland, all of the species found to date and indeed any bat species that may remain undetected up to the present are afforded legal protection under Irish and EU legislation and agreements (Wildlife Act (1976), Wildlife (Amendment) Act (2000), S.I. No. 94 of 1997 and S.I. No. 378 OF 2005 implementing the EU Habitats Directive, Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animal) and the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats).

Bat Conservation Ireland data: search results 23 Jun 2020			
Search parameters: Roosts Transects Ad-hoc observation sites with observations of all bats within 1000m of N9678735056.			
Roosts			
Name	Grid reference	Address	Species observed
Crodaun; cottage	N9700035000	Gateway Site; Celbridge;	Pipistrellus pipistrellus
Transects			
Name	Grid reference start	Species	
Celbridge Gateway Site	N9700035000	Myotis nattereri;Nyctalus Leisleri;Pipistrellus pipistrellus.	
Ad-hoc observations			

Survey	Grid reference	Date	Species
Bat Surveys - Tina Aughney	N9734	18/05/2008	Myotis spp.; Nyctalus Leisleri; Pipistrellus; Pipistrellus pygmaeus; Plecotus auritus

Methodology

On 8 June 2020, I examined the site visually for evidence of bat roosts in daylight and this was followed, on 8 and 9 June 2020, by a night-time bat detector survey utilising ultrasonic receivers to convert bat signals used in navigation and social interaction to a recordable and measurable pulse. In the field, one piece of equipment (EM3 – see below) provided a screen for instant evaluation while the capacity to record signals allowed for bat identification to be confirmed using sound analysis software (Kaleidoscope). The analysis was carried out by automatic identification and then evaluation of the identifications by the bat specialist. A second and third bat detector by means of static monitors were also employed to check for bat activity throughout the night in addition to the active surveys focussed on dusk and dawn.

Equipment employed:

Echometer 3 (EM3) Real Time Expansion monitor with SD card recording and Garmin GPS attachment

Songmeter2Bat+ monitor for overnight recordings within the site and positioned within the track connecting the fields and parallel to the public road

Songmeter Mini attached to a fence within hedgerow within the site to evaluate bat feeding and commuting within the site. The detector was moved to a large ash on the edge of the outside farm lane by 04.20 hours.

Maps of the proposed development at Celbridge and Google Maps

Huawei Smartphone 6 with digital camera

An EM3 was held for the entire survey period and recorded all bat signals detectable by its transducer. Surveying commenced prior to sunset which was at 21.51 hours and continued until 23.20 hours. All hedgerow was walked, and all fields were traversed to identify bat activity within all areas of the proposed development.

The pre-dawn assessment commenced at 04.00 hours and continued until 05.00 hours by which time all bat activity had ceased. Sunrise was at 04.59 hours.

Survey constraints

Conditions for surveying were suited to bat activity on all occasions. At sunset (21.51 hours) the temperature was 13 degrees Celsius. There was no rain on the night of survey and temperatures were adequate for bat feeding activity. Wind was 10 kmph at sunset and this led to a relatively still night throughout the site. Bat activity was present at all stages of the survey and conditions were clearly highly suited to bat activity.

Existing Environment

Bat species noted in 2020 in the Celbridge site

Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Leisler's bat	<i>Nyctalus Leisleri</i>
Brown long-eared bat	<i>Plecotus auritus</i>

There were no bat roosts noted within the site in June 2020.

Bat activity within the site commenced at 22.13 hours with the arrival of a Leisler's bat while at 22.14 hours, common pipistrelles were noted on two monitors in two separate positions (in the outside lane and within a hedge line – see Figure 1). Soprano pipistrelle activity arrived later at 22.31 hours as noted by both static monitors and was noted by the active survey at 22.33 hours. The last recordings and observations of bats within the site were of common pipistrelles at 04.32 hours feeding along the outside lane and a large mature ash and of a Leisler's bat flying southeast towards the housing estate at 04.41 hours. Soprano pipistrelle activity was also scarce prior to sunrise, with the last signal recorded by a static monitor at 04.29 hours. This was within the farm lane (to the outside of the fields). Here, there was sustained soprano pipistrelle bat activity for 8 minutes at 00.12 hours.

Brown long-eared bat activity was noted on two occasions, at 22.41 hours in the north-eastern corner of the proposed development (the EM3 active survey – signal not saved) and at 00.13 hours along hedgerow (by the Songmeter Mini). This species is often overlooked in surveys as the signal is very directional and weak compared to most other bat species.

Modifications or Features introduced by the proposed development

✦Vegetation alterations

There will be a requirement to remove much of the vegetation from the site to facilitate the project. This will include mature ash trees.

✦Lighting

There will be an increased level of lighting as there will be an introduction of housing to an agricultural site. There will be increased lighting for the construction and operation of the new buildings. This would lead to the disturbance of light intolerant or shy species while the more urban-adapted species will be affected to a lesser extent.

Pipistrelles and Leisler's bats are less affected by light than all other species, but Pipistrelles will avoid light where possible. Leisler's bats may be attracted to lighting later into the night-time to feed on moths that themselves are attracted or disorientated by the lights. Species such as brown long-eared bat typically avoid and are intolerant of light.

Impacts of The Proposed Development

Potential roost loss

Tree removal creates a risk of roost loss. This could lead to injury or death to a species protected under the Wildlife Act and Habitats Directive (if a roost were present and not identified) and would therefore constitute a breach of the Irish and EU legislation.

There is no evidence that the trees within the site are in use as bat roosts from the survey of the June 2020. Bats move in and out of roosts on a regular basis and individuals may be present at times other than a specific survey without any evidence.

Disturbance from lighting

Lighting will be utilised for two different functions:

1. Access and safety and 2) Security and policing. The former is to allow ease of use at night. The latter is to ensure a perceived higher security level. This may affect light-intolerant bat species (such as brown long-eared bat) during foraging and if directed at emergence points would affect all bat species, even those that will feed in illuminated areas.

Species such as Leisler's bat, soprano and common pipistrelles are less affected than almost all other Irish bat species and this would not be a significant impact. Nonetheless, lighting reduces foraging by pipistrelles. At worst, without mitigation, it would be a permanent moderately negative impact.

Reduced Feeding

Reduced vegetation including the removal of any of the trees within the site may lead to reduced insect abundance. On the night of survey, four species of bat were noted.

Without mitigation, this would be a permanent slight negative impact.

Proposed Mitigation

The following measures are consistent with and fine-tune the measures proposed within the Biodiversity chapter of the EIAR which proposed the following:

(a) For risk of construction mortality:

A dedicated bat survey shall be carried out by a suitably qualified bat ecologist prior to the commencement of development and during the appropriate season.

This should determine if bats are roosting in any of the features on the site and if the development of this project requires a derogation licence from the NPWS. Any trees that have been identified as roosts may not be removed without the implementation of the necessary measures to ensure the protection of any resident bats. A licensed bat specialist shall undertake any exclusion measures, the capture and handling of bats and the safeguarding of bats until any risk has been completed (e.g. tree felling). All the mature trees within the site shall be examined for the presence of bats prior to felling by a bat specialist. Should bats be noted in any tree, it is a protected structure and a derogation must be sought as discussed above.

(b) For risk from lost feeding and commuting opportunities and roost potential:

New hedgerows will retain connectivity through the site for biodiversity, as well as joining up with other hedgerows and green spaces beyond the development site boundary.

Where there is an opportunity to provide vegetative cover, native and local plant species should be employed including typical plants such as oak (the greatest value for most wildlife), hawthorn, blackthorn, elder, gorse, bramble, in addition to other species such as dog rose with an encouragement of species such as *Clematis* and other species attractive to moths.

Six bat boxes will be erected at appropriate locations throughout the site to provide artificial roosting sites.

This shall include the following mix of boxes:

2 x 2FR Schwegler bat tubes incorporated into the apartment wall as shown in Figure 2.

4 x Schwegler 2F with Double Front panel in the green areas proposed for the perimeter of the site (see Figure 2)

All bat boxes must be *unlit* and those not built into the apartments should be at least 2.5 metres above ground height and preferably 3 metres or higher.

(c) For risk from lighting:

The lighting plan has been reviewed and no lighting is directed towards external boundary hedgerows.

Lighting is to be limited by the use of directional cowls while LED bulbs are to be employed (these have lower impact on bats than traditional mercury-halide lamps).

- Motion-activated sensor lighting is preferable to reduce light pollution.
- None of the remaining trees or trees proposed for planting as in Figure 2 shall be illuminated.
- Lighting should be directed downwards away from the treetops.
- All luminaires shall lack UV elements when manufactured and shall be LED
- A warm white spectrum (ideally <2700 Kelvin as low as Council limitations allow) shall be adopted to reduce blue light component
- Luminaires shall feature peak wavelengths higher than 550nm
- Tree crowns shall remain unilluminated

IMPACTS OF THE DEVELOPMENT AFTER MITIGATION

It is predicted that this development will have no direct impact upon the conservation status of bats. There will be a slight loss in feeding opportunities for bats due to vegetation loss and increased building density. Over time, this will reduce as vegetation develops. The residual impact of the proposed development, after mitigation, is not significant.



Figure 1: Bat activity within the Celbridge site 8th to 9th June 2020

Legend

Yellow paddle - Leisler's bat

Blue paddle - Soprano pipistrelle

Blue box - Mini location (most of night)

Purple box - Mini location from 04.20 hours

Green paddle - Common pipistrelle

● - Brown long-eared bat

White box - SM2 location



Figure 2: Mitigation Measures For Bats at Crodaun, Celbridge

Yellow box – Area where lighting will be avoided to allow feeding opportunities for bats

Blue box – Area with enhanced planting for foraging and commuting corridors for bats

Red oval – 2 s 2 FR bat boxes in apartment wall

Orange ovals – 2F bat boxes with Double Front Panel

Lighting to avoid areas of trees and hedgerow

table 1: data from handheld em3 8th June 2020 to 9th June 2020

time	auto id	pulses	manual id
22:13:19	Leisler's bat	12	Leisler's bat
22:16:00	Leisler's bat	34	Leisler's bat
22:16:20	Leisler's bat	12	Leisler's bat
22:21:01	common pipistrelle	57	common pipistrelle
22:21:21	NoID	2	common pipistrelle
22:22:41	Leisler's bat	11	Leisler's bat
22:26:02	Leisler's bat	11	Leisler's bat
22:33:04	soprano pipistrelle	12	soprano pipistrelle
22:33:24	soprano pipistrelle	49	soprano pipistrelle
22:35:24	soprano pipistrelle	32	soprano pipistrelle
22:36:05	Nathusius' pipistrelle	21	common pipistrelle
22:38:05	common pipistrelle	24	common pipistrelle
22:38:25	common pipistrelle	5	common pipistrelle
22:38:45	common pipistrelle	12	common pipistrelle
22:39:45	common pipistrelle	27	common pipistrelle
22:40:26	Leisler's bat	7	Leisler's bat
22:40:46	Leisler's bat	6	common pipistrelle Leisler's bat
22:41:06	common pipistrelle	15	common pipistrelle Leisler's bat
22:41:26	Leisler's bat	17	Leisler's bat
22:42:06	common pipistrelle	63	common pipistrelle
22:42:46	common pipistrelle	25	common pipistrelle
22:43:06	Leisler's bat	27	Leisler's bat
22:44:27	Leisler's bat	13	Leisler's bat
22:46:27	common pipistrelle	3	common pipistrelle
22:47:07	common pipistrelle	3	common pipistrelle
22:47:27	common pipistrelle	26	common pipistrelle
22:49:08	common pipistrelle	33	common pipistrelle
22:49:28	Nathusius' pipistrelle	19	common pipistrelle
22:52:08	common pipistrelle	24	common pipistrelle
22:56:29	Leisler's bat	7	Leisler's bat
22:57:50	common pipistrelle	23	common pipistrelle
22:58:10	common pipistrelle	61	common pipistrelle
22:58:30	common pipistrelle	69	common pipistrelle
23:02:31	common pipistrelle	26	common pipistrelle
23:02:51	common pipistrelle	4	common pipistrelle
23:09:53	Leisler's bat	9	Leisler's bat
23:10:13	Leisler's bat	6	Leisler's bat
23:11:33	Leisler's bat	4	Leisler's bat
23:11:53	Leisler's bat	5	Leisler's bat
23:18:55	Leisler's bat	7	Leisler's bat
23:19:55	Nathusius' pipistrelle	4	common pipistrelle
23:20:16	Leisler's bat	2	Leisler's bat
23:20:36	Leisler's bat	3	Leisler's bat
04:00:46	Leisler's bat	5	Leisler's bat
04:01:06	common pipistrelle	70	common pipistrelle
04:01:26	Leisler's bat	4	Leisler's bat
04:01:47	common pipistrelle	55	common pipistrelle
04:02:07	common pipistrelle	62	common pipistrelle
04:02:27	common pipistrelle	73	common pipistrelle
04:02:47	common pipistrelle	50	common pipistrelle
04:03:27	Leisler's bat	8	Leisler's bat
04:08:48	common pipistrelle	28	common pipistrelle
04:09:48	Nathusius' pipistrelle	28	common pipistrelle
04:12:49	common pipistrelle	21	common pipistrelle
04:15:10	common pipistrelle	12	common pipistrelle

04:16:10	common pipistrelle	25	common pipistrelle
04:18:11	common pipistrelle	45	common pipistrelle
04:19:11	Leisler's bat	8	Leisler's bat
04:22:52	common pipistrelle	5	common pipistrelle
04:23:12	common pipistrelle	2	common pipistrelle
04:25:53	Leisler's bat	2	Leisler's bat
04:26:33	common pipistrelle	20	common pipistrelle
04:26:53	common pipistrelle	42	common pipistrelle
04:27:13	common pipistrelle	5	common pipistrelle
04:27:33	common pipistrelle	44	common pipistrelle
04:28:13	common pipistrelle	6	common pipistrelle
04:28:33	common pipistrelle	86	common pipistrelle
04:28:53	common pipistrelle	45	common pipistrelle
04:29:13	common pipistrelle	34	common pipistrelle
04:29:33	common pipistrelle	63	common pipistrelle
04:30:14	common pipistrelle	75	common pipistrelle
04:30:34	common pipistrelle	81	common pipistrelle
04:30:54	common pipistrelle	104	common pipistrelle
04:31:14	common pipistrelle	42	common pipistrelle
04:31:34	common pipistrelle	135	common pipistrelle
04:31:54	common pipistrelle	26	common pipistrelle
04:32:14	common pipistrelle	24	common pipistrelle
04:41:37	Leisler's bat	10	Leisler's bat
04:41:57	Leisler's bat	12	Leisler's bat

table 2: data from Songmeter mini placed within the hedgerow on site

time	auto id	pulses	manual id
22:14:28	Leisler's bat	28	Leisler's bat
22:15:31	Leisler's bat	12	Leisler's bat
22:15:55	Leisler's bat	8	Leisler's bat
22:16:02	Leisler's bat	37	Leisler's bat
22:19:15	common pipistrelle	4	common pipistrelle
22:20:08	common pipistrelle	3	common pipistrelle
22:21:01	common pipistrelle	87	common pipistrelle
22:21:15	common pipistrelle	12	common pipistrelle
22:21:31	common pipistrelle	54	common pipistrelle
22:21:43	common pipistrelle	13	common pipistrelle
22:21:53	common pipistrelle	18	common pipistrelle
22:22:02	common pipistrelle	5	common pipistrelle
22:22:09	common pipistrelle	18	common pipistrelle
22:22:20	common pipistrelle	11	common pipistrelle
22:22:25	common pipistrelle	18	common pipistrelle
22:22:34	common pipistrelle	10	common pipistrelle
22:22:42	common pipistrelle	6	common pipistrelle
22:22:48	common pipistrelle	14	common pipistrelle
22:22:57	common pipistrelle	6	common pipistrelle
22:23:05	common pipistrelle	14	common pipistrelle
22:23:26	common pipistrelle	15	common pipistrelle
22:23:37	common pipistrelle	8	common pipistrelle
22:24:02	common pipistrelle	3	common pipistrelle
22:24:24	common pipistrelle	4	common pipistrelle
22:24:41	common pipistrelle	4	common pipistrelle
22:24:52	common pipistrelle	5	common pipistrelle
22:25:03	Leisler's bat	63	Leisler's bat
22:25:19	common pipistrelle	30	common pipistrelle
22:25:42	common pipistrelle	2	common pipistrelle
22:25:53	common pipistrelle	5	common pipistrelle
22:25:58	Leisler's bat	37	Leisler's bat
22:26:13	common pipistrelle	11	common pipistrelle
22:26:21	common pipistrelle	7	common pipistrelle
22:27:00	common pipistrelle	5	common pipistrelle
22:27:16	common pipistrelle	10	common pipistrelle
22:28:08	common pipistrelle	6	common pipistrelle
22:28:18	common pipistrelle	6	common pipistrelle
22:28:27	common pipistrelle	7	common pipistrelle
22:28:42	common pipistrelle	9	common pipistrelle
22:28:51	common pipistrelle	5	common pipistrelle
22:29:00	common pipistrelle	19	common pipistrelle
22:30:18	common pipistrelle	5	common pipistrelle
22:30:28	common pipistrelle	22	common pipistrelle
22:31:33	common pipistrelle	7	common pipistrelle

22:31:53	soprano pipistrelle	9	soprano pipistrelle
22:32:43	common pipistrelle	12	common pipistrelle
22:32:50	common pipistrelle	46	common pipistrelle
22:33:09	soprano pipistrelle	9	soprano pipistrelle
22:33:30	common pipistrelle	8	common pipistrelle
22:33:41	soprano pipistrelle	38	soprano pipistrelle
22:35:33	soprano pipistrelle	15	soprano pipistrelle
22:35:40	common pipistrelle	27	common pipistrelle
22:35:55	common pipistrelle	38	common pipistrelle
22:36:09	common pipistrelle	30	common pipistrelle
22:36:18	common pipistrelle	102	common pipistrelle
22:36:33	common pipistrelle	3	common pipistrelle
22:36:37	common pipistrelle	63	common pipistrelle
22:38:36	soprano pipistrelle	39	soprano pipistrelle
22:40:39	common pipistrelle	30	common pipistrelle
22:42:29	common pipistrelle	10	common pipistrelle
22:42:39	Leisler's bat	11	Leisler's bat
22:43:28	common pipistrelle	34	common pipistrelle
22:43:38	common pipistrelle	35	common pipistrelle
22:43:54	common pipistrelle	11	common pipistrelle
22:44:14	Leisler's bat	2	Leisler's bat
22:44:24	common pipistrelle	5	common pipistrelle
22:45:00	Leisler's bat	6	Leisler's bat
22:45:51	common pipistrelle	33	common pipistrelle
22:46:21	common pipistrelle	30	common pipistrelle
22:51:52	Leisler's bat	4	Leisler's bat
22:52:48	Leisler's bat	5	Leisler's bat
22:52:55	common pipistrelle	15	common pipistrelle
22:53:34	Leisler's bat	19	Leisler's bat
22:54:22	common pipistrelle	30	common pipistrelle
22:54:30	soprano pipistrelle	40	soprano pipistrelle
22:56:36	Leisler's bat	6	Leisler's bat
22:58:08	Leisler's bat	7	Leisler's bat
22:59:32	common pipistrelle	20	common pipistrelle
23:02:38	Leisler's bat	2	Leisler's bat
23:04:29	Leisler's bat	12	Leisler's bat
23:05:19	Leisler's bat	9	Leisler's bat
23:06:39	Leisler's bat	6	Leisler's bat
23:08:54	Leisler's bat	2	Leisler's bat
23:10:37	Leisler's bat	8	Leisler's bat
23:15:47	Leisler's bat	3	Leisler's bat
23:19:36	Leisler's bat	2	Leisler's bat
23:35:38	soprano pipistrelle	14	soprano pipistrelle
23:37:15	Leisler's bat	24	Leisler's bat
23:40:58	Leisler's bat	8	Leisler's bat
23:43:44	Leisler's bat	2	Leisler's bat

23:44:07	Leisler's bat	5	Leisler's bat
23:44:28	soprano pipistrelle	6	soprano pipistrelle
23:46:42	Leisler's bat	6	Leisler's bat
23:47:08	Leisler's bat	3	Leisler's bat
23:54:38	soprano pipistrelle	16	soprano pipistrelle
23:55:39	common pipistrelle	26	common pipistrelle
00:03:25	common pipistrelle	21	common pipistrelle
00:03:42	common pipistrelle	33	common pipistrelle
00:05:24	common pipistrelle	8	common pipistrelle
00:08:40	common pipistrelle	26	common pipistrelle
00:08:55	common pipistrelle	25	common pipistrelle
00:10:14	common pipistrelle	26	common pipistrelle
00:10:41	common pipistrelle	27	common pipistrelle
00:11:40	common pipistrelle	2	common pipistrelle
00:13:33	brown long-eared bat	3	brown long-eared bat
00:13:43	common pipistrelle	22	common pipistrelle
00:14:08	common pipistrelle	49	common pipistrelle
00:16:09	common pipistrelle	24	common pipistrelle
00:16:48	common pipistrelle	42	common pipistrelle
00:17:22	common pipistrelle	25	common pipistrelle
00:17:35	common pipistrelle	10	common pipistrelle
00:17:56	common pipistrelle	29	common pipistrelle
00:19:10	common pipistrelle	5	common pipistrelle
00:21:34	common pipistrelle	11	common pipistrelle
00:23:19	common pipistrelle	7	common pipistrelle
00:24:53	common pipistrelle	47	common pipistrelle
00:29:45	common pipistrelle	41	common pipistrelle
00:31:44	common pipistrelle	16	common pipistrelle
00:32:20	Leisler's bat	9	Leisler's bat
00:33:15	common pipistrelle	6	common pipistrelle
00:35:18	common pipistrelle	37	common pipistrelle
00:38:12	common pipistrelle	5	common pipistrelle
00:45:44	common pipistrelle	6	common pipistrelle
00:46:14	common pipistrelle	60	common pipistrelle
00:46:31	common pipistrelle	11	common pipistrelle
00:46:36	common pipistrelle	66	common pipistrelle
00:53:04	common pipistrelle	19	common pipistrelle
00:53:31	common pipistrelle	14	common pipistrelle
00:54:09	common pipistrelle	9	common pipistrelle
00:58:53	soprano pipistrelle	9	soprano pipistrelle
01:19:18	soprano pipistrelle	8	soprano pipistrelle
01:21:49	soprano pipistrelle	7	soprano pipistrelle
01:26:05	common pipistrelle	25	common pipistrelle
01:27:09	common pipistrelle	14	common pipistrelle
01:30:43	common pipistrelle	19	common pipistrelle
01:31:50	common pipistrelle	10	common pipistrelle

01:37:55	common pipistrelle	36	common pipistrelle
01:40:43	common pipistrelle	14	common pipistrelle
01:41:35	common pipistrelle	9	common pipistrelle
01:41:53	common pipistrelle	8	common pipistrelle
01:43:01	common pipistrelle	22	common pipistrelle
01:45:43	common pipistrelle	9	common pipistrelle
01:46:21	common pipistrelle	21	common pipistrelle
01:48:04	common pipistrelle	13	common pipistrelle
01:48:40	common pipistrelle	26	common pipistrelle
01:49:44	common pipistrelle	12	common pipistrelle
01:55:23	common pipistrelle	24	common pipistrelle
01:56:41	common pipistrelle	14	common pipistrelle
02:02:20	common pipistrelle	16	common pipistrelle
02:10:49	common pipistrelle	7	common pipistrelle
02:11:15	common pipistrelle	47	common pipistrelle
02:16:19	common pipistrelle	4	common pipistrelle
02:23:14	common pipistrelle	20	common pipistrelle
02:27:20	common pipistrelle	8	common pipistrelle
02:27:26	common pipistrelle	10	common pipistrelle
02:27:40	common pipistrelle	10	common pipistrelle
02:29:52	common pipistrelle	7	common pipistrelle
02:36:40	common pipistrelle	18	common pipistrelle
02:36:52	common pipistrelle	6	common pipistrelle
02:36:58	common pipistrelle	30	common pipistrelle
02:37:54	common pipistrelle	8	common pipistrelle
02:38:05	common pipistrelle	37	common pipistrelle
02:38:50	common pipistrelle	27	common pipistrelle
02:40:06	common pipistrelle	13	common pipistrelle
02:40:17	common pipistrelle	21	common pipistrelle
02:40:32	common pipistrelle	5	common pipistrelle
02:41:00	common pipistrelle	18	common pipistrelle
02:43:20	soprano pipistrelle	8	soprano pipistrelle
02:51:03	common pipistrelle	13	common pipistrelle
02:58:22	common pipistrelle	14	common pipistrelle
03:17:38	Leisler's bat	2	Leisler's bat
03:19:47	common pipistrelle	17	common pipistrelle
03:22:18	common pipistrelle	10	common pipistrelle
03:22:40	common pipistrelle	30	common pipistrelle
03:24:54	common pipistrelle	21	common pipistrelle
03:38:37	soprano pipistrelle	12	soprano pipistrelle
03:48:23	common pipistrelle	31	common pipistrelle
03:52:05	common pipistrelle	26	common pipistrelle
03:54:36	Leisler's bat	29	Leisler's bat
04:00:30	common pipistrelle	30	common pipistrelle
04:01:44	Leisler's bat	21	Leisler's bat
04:02:00	Leisler's bat	27	Leisler's bat

04:02:28	common pipistrelle	28	common pipistrelle
04:03:00	common pipistrelle	24	common pipistrelle
04:03:35	common pipistrelle	15	common pipistrelle
04:03:55	common pipistrelle	46	common pipistrelle
04:08:17	common pipistrelle	11	common pipistrelle
04:08:24	common pipistrelle	15	common pipistrelle
04:08:39	common pipistrelle	17	common pipistrelle
04:09:02	common pipistrelle	19	common pipistrelle
04:10:06	soprano pipistrelle	5	soprano pipistrelle
04:10:31	common pipistrelle	20	common pipistrelle
04:11:08	Leisler's bat	19	Leisler's bat
04:15:15	common pipistrelle	4	common pipistrelle
04:15:43	common pipistrelle	20	common pipistrelle
04:16:33	common pipistrelle	43	common pipistrelle
04:16:46	Leisler's bat	23	Leisler's bat
04:17:24	common pipistrelle	3	common pipistrelle
04:18:31	common pipistrelle	33	common pipistrelle
04:19:15	common pipistrelle	20	common pipistrelle
04:19:30	common pipistrelle	7	common pipistrelle
04:19:40	Leisler's bat	21	Leisler's bat
04:19:57	common pipistrelle	36	common pipistrelle
04:23:08	common pipistrelle	5	common pipistrelle
04:26:12	common pipistrelle	8	common pipistrelle
04:26:35	common pipistrelle	14	common pipistrelle
04:26:47	common pipistrelle	61	common pipistrelle
04:27:02	common pipistrelle	10	common pipistrelle
04:27:16	common pipistrelle	7	common pipistrelle
04:27:31	common pipistrelle	35	common pipistrelle
04:28:08	Leisler's bat	4	Leisler's bat
04:28:22	common pipistrelle	56	common pipistrelle
04:28:37	common pipistrelle	126	common pipistrelle
04:28:52	common pipistrelle	65	common pipistrelle
04:29:21	common pipistrelle	48	common pipistrelle
04:29:32	common pipistrelle	80	common pipistrelle
04:29:51	soprano pipistrelle	13	soprano pipistrelle
04:30:00	Leisler's bat	6	Leisler's bat
04:30:16	common pipistrelle	38	common pipistrelle
04:30:34	common pipistrelle	14	common pipistrelle
04:30:47	common pipistrelle	13	common pipistrelle
04:30:56	common pipistrelle	3	common pipistrelle
04:31:00	common pipistrelle	15	common pipistrelle
04:31:07	common pipistrelle	35	common pipistrelle
04:31:36	common pipistrelle	16	common pipistrelle
04:31:48	common pipistrelle	8	common pipistrelle
04:32:07	common pipistrelle	7	common pipistrelle
04:32:41	Leisler's bat	40	Leisler's bat

04:33:08	Leisler's bat	32	Leisler's bat
04:33:25	common pipistrelle	10	common pipistrelle
04:33:43	common pipistrelle	14	common pipistrelle
04:33:50	common pipistrelle	13	common pipistrelle
04:41:47	Leisler's bat	41	Leisler's bat

table 3: data recorded by the songmeter2bat+ on the farm lane parallel to the public road

time	auto id	pulses	manual id
22:14:29	common pipistrelle	8	
22:16:29	common pipistrelle	7	
22:16:33	common pipistrelle	9	
22:16:53	common pipistrelle	10	
22:18:21	common pipistrelle	23	
22:18:31	common pipistrelle	10	
22:18:35	common pipistrelle	7	
22:18:39	common pipistrelle	45	
22:18:52	common pipistrelle	11	
22:18:57	common pipistrelle	12	
22:19:01	common pipistrelle	11	
22:19:07	common pipistrelle	23	
22:19:18	common pipistrelle	8	
22:19:20	common pipistrelle	12	
22:19:27	common pipistrelle	17	
22:19:33	common pipistrelle	8	
22:19:36	common pipistrelle	8	
22:19:44	soprano pipistrelle	10	
22:19:48	common pipistrelle	23	
22:19:55	common pipistrelle	28	
22:20:03	common pipistrelle	20	
22:20:10	common pipistrelle	21	
22:20:18	common pipistrelle	12	
22:20:24	common pipistrelle	14	
22:20:31	common pipistrelle	14	
22:20:40	common pipistrelle	34	
22:20:49	common pipistrelle	10	
22:20:55	common pipistrelle	11	
22:21:06	common pipistrelle	19	
22:21:57	common pipistrelle	7	
22:22:04	common pipistrelle	8	
22:22:33	common pipistrelle	18	
22:24:10	common pipistrelle	7	
22:24:15	common pipistrelle	4	
22:24:35	Myotis	4	common pipistrelle
22:24:52	common pipistrelle	11	common pipistrelle
22:24:59	common pipistrelle	9	common pipistrelle

22:25:40	common pipistrelle	4	common pipistrelle
22:26:18	common pipistrelle	7	common pipistrelle
22:26:26	common pipistrelle	6	common pipistrelle
22:26:48	common pipistrelle	6	common pipistrelle
22:30:42	common pipistrelle	12	common pipistrelle
22:30:49	common pipistrelle	22	common pipistrelle
22:30:53	common pipistrelle	5	common pipistrelle
22:31:21	common pipistrelle	2	common pipistrelle
22:31:37	common pipistrelle	3	common pipistrelle myotis
22:33:51	common pipistrelle	7	common pipistrelle
22:35:52	common pipistrelle	8	common pipistrelle
22:36:32	common pipistrelle	11	common pipistrelle
22:36:46	common pipistrelle	10	common pipistrelle
22:42:55	common pipistrelle	10	common pipistrelle
22:43:01	common pipistrelle	8	common pipistrelle
22:44:32	common pipistrelle	5	common pipistrelle
22:56:09	soprano pipistrelle	10	soprano pipistrelle
23:02:27	common pipistrelle	9	common pipistrelle
23:02:30	common pipistrelle	6	common pipistrelle
23:30:34	common pipistrelle	8	common pipistrelle
23:31:02	common pipistrelle	9	
23:31:48	common pipistrelle	10	
23:35:08	soprano pipistrelle	4	
23:36:07	common pipistrelle	4	
23:36:09	common pipistrelle	13	
23:36:16	common pipistrelle	16	
23:41:48	soprano pipistrelle	10	
23:49:23	common pipistrelle	12	
23:49:45	common pipistrelle	12	
23:50:09	common pipistrelle	11	
23:50:53	common pipistrelle	8	
23:51:20	common pipistrelle	11	
23:51:36	common pipistrelle	12	
23:56:00	common pipistrelle	12	
23:56:18	common pipistrelle	13	
23:58:14	soprano pipistrelle	11	
23:58:37	common pipistrelle	11	
23:58:46	common pipistrelle	10	
23:59:10	common pipistrelle	20	
23:59:28	common pipistrelle	20	
23:59:34	NoID	1	common pipistrelle
23:59:47	common pipistrelle	10	common pipistrelle
23:59:59	common pipistrelle	11	common pipistrelle
00:00:20	common pipistrelle	10	common pipistrelle
00:00:44	common pipistrelle	10	common pipistrelle
00:00:56	common pipistrelle	9	common pipistrelle

00:01:28	common pipistrelle	9	common pipistrelle
00:01:47	common pipistrelle	13	common pipistrelle
00:02:16	common pipistrelle	11	common pipistrelle
00:02:56	common pipistrelle	13	common pipistrelle
00:06:12	common pipistrelle	14	common pipistrelle
00:06:18	common pipistrelle	8	common pipistrelle
00:06:25	common pipistrelle	22	common pipistrelle
00:06:42	common pipistrelle	9	common pipistrelle
00:07:09	common pipistrelle	14	common pipistrelle
00:07:16	common pipistrelle	13	common pipistrelle
00:07:39	common pipistrelle	18	common pipistrelle
00:08:20	common pipistrelle	10	common pipistrelle
00:08:32	common pipistrelle	13	common pipistrelle
00:08:59	common pipistrelle	10	common pipistrelle
00:09:05	common pipistrelle	11	common pipistrelle
00:09:36	common pipistrelle	13	common pipistrelle
00:09:41	common pipistrelle	11	common pipistrelle
00:09:45	common pipistrelle	12	common pipistrelle
00:12:42	soprano pipistrelle	14	soprano pipistrelle
00:13:06	soprano pipistrelle	8	soprano pipistrelle
00:13:12	soprano pipistrelle	32	soprano pipistrelle
00:13:19	NoID	13	soprano pipistrelle
00:13:25	soprano pipistrelle	14	soprano pipistrelle
00:13:41	soprano pipistrelle	12	soprano pipistrelle
00:13:47	soprano pipistrelle	15	soprano pipistrelle
00:13:52	soprano pipistrelle	7	soprano pipistrelle
00:18:36	soprano pipistrelle	9	soprano pipistrelle
00:18:43	soprano pipistrelle	11	soprano pipistrelle
00:19:09	soprano pipistrelle	5	soprano pipistrelle
00:19:12	soprano pipistrelle	8	soprano pipistrelle
00:19:17	soprano pipistrelle	12	soprano pipistrelle
00:19:38	soprano pipistrelle	28	soprano pipistrelle
00:20:17	soprano pipistrelle	11	soprano pipistrelle
00:20:36	soprano pipistrelle	10	soprano pipistrelle
00:23:57	common pipistrelle	10	common pipistrelle
00:24:05	common pipistrelle	10	common pipistrelle
00:24:46	common pipistrelle	10	common pipistrelle
00:25:01	common pipistrelle	6	common pipistrelle
00:25:25	common pipistrelle	23	common pipistrelle
00:25:50	common pipistrelle	13	common pipistrelle
00:26:11	common pipistrelle	2	common pipistrelle
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00:26:23	common pipistrelle	10	common pipistrelle
00:26:30	common pipistrelle	8	common pipistrelle
00:26:36	common pipistrelle	12	common pipistrelle
00:26:39	common pipistrelle	12	common pipistrelle

00:27:00	common pipistrelle	11	common pipistrelle
00:27:16	common pipistrelle	7	common pipistrelle
00:27:37	common pipistrelle	9	common pipistrelle
00:27:44	common pipistrelle	4	common pipistrelle
00:28:07	common pipistrelle	11	
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00:39:50	common pipistrelle	4	
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00:40:18	common pipistrelle	6	
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00:40:44	common pipistrelle	7	
00:41:00	common pipistrelle	13	

00:41:12	common pipistrelle	5	
00:41:20	common pipistrelle	15	
00:41:32	common pipistrelle	5	
00:41:45	common pipistrelle	32	
00:41:53	soprano pipistrelle	10	
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00:52:21	common pipistrelle	5	

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00:52:44	common pipistrelle	7	
00:52:53	soprano pipistrelle	6	
00:53:00	soprano pipistrelle	11	
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01:02:16	common pipistrelle	4	
01:02:24	common pipistrelle	5	
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01:03:27	common pipistrelle	6	

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01:21:37	common pipistrelle	4	

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01:23:41	common pipistrelle	5	
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01:24:08	common pipistrelle	9	common pipistrelle
01:24:11	Nathusius' pipistrelle	15	common pipistrelle
01:24:14	Myotis	4	common pipistrelle
01:24:25	common pipistrelle	7	common pipistrelle
01:24:47	common pipistrelle	6	common pipistrelle
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01:25:15	common pipistrelle	5	
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