

Study of swarming in Essonne and Seine and Marne

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In 2015 and 2016, we studied the phenomenon of swarming in 2 sites located in Essonne and in 2 sites located in the Seine and Marne.

Method

The method consists of installing an autonomous ultrasound detector at the entrance to each site..

The system consists of a micro ultrasonic, and an ultrasound detector powered by a 12-volt battery changed every month.

This detector records all time-expanding ultrasound and records them on memory card. It records the date and time of registration.

This method allows you to know all the chiropractic passages at the entrance of the quarry.

The device used is a SM2BAT ultrasound detector that can record up to 192,000 hertz in 16 bits and thus treat ultrasound with good quality of return. The volume of microphones' stability is an omnidirectional sphere, that is, it picks up sound signals in all directions..

The ultrasonic files recorded in compressed "wac" format by the SM2 are then converted by the "wac2wav" program (*Wildlife acoustics*) into "wav" files for analysis.

This program must be set up so that the files have a duration of 5 seconds in order to respect the standardization of the recorded files and thus be able to compare the records (Lustrat P. 2001).

We then use the "ScanR" (*Binary acoustic technology*) program to analyze these files.

Chiropractic identification is verified using the Batsound and Adobe Hearing programs. All files are manually scanned.

Definition of "swarming"

Every year at the end of summer, some bat species congregate in large numbers at a few sites: the "swarming" sites, in English, whose French equivalent is roughly "swarming".

This term was first used by Fenton (1969), which he defined as chiropractic theft around hibernation sites in late summer and autumn.

In the Northern Hemisphere, this period is between early August and late October, but peak activity occurs from mid-August to mid-September.

Social behaviours, especially reproduction behaviours, are noted on this occasion. Chiropractors can travel several hundred kilometres to meet on this occasion, and not overwinter on site afterwards.

Hibernation sites are not necessarily breeding sites and the reverse is also true.

This mechanism would promote genetic mixing.

The impact on protection is very important because the disappearance of a "swarming" site can result in the absence of reproduction for some species, and therefore, their extinctions.

Site 1: Etampes Quarries (91) (site closed by a grid)

The activity of the chiropractic mushrooms of Etampes, in The Essonne, was studied for 8 months (March to October 2015) as part of a study commissioned by the General Council of Essonne.

The results show that chiropractic patients make visits to the cavity all year round, but that it is in August that the activity is strongest.

15,191 contacts were recorded in August 2015, involving 16 species of chiropractic.

	Bar b	Sér ot	Alc Wall	Mur Bei	Wall Good	Wall Two	Ech Wall	Soft wall	Wall Night	Gr wall	Night every	Noc Lei	Pip Cow	Pip Nat	Pip with	Or sp	Tota l
August 2	0	2	15	2	3	3	11	0	0	2	0	0	0	0	53	0	91
August 3	40	9	243	1	34	37	239	14	4	19	0	4	10	5	1421	1	2081
August 4	14	5	376	8	51	12	269	9	1	10	0	1	10	7	875	4	1652
August 5	20	20	397	24	24	27	263	12	18	35	0	0	12	6	276	3	1137
August 6	3	5	374	53	1	57	302	13	8	6	0	1	17	5	549	7	1401
August 27	1	0	0	0	9	3	0	0	0	0	0	0	3	0	18	0	34
August 28	6	27	2	1	391	11	86	1	2	9	3	7	22	13	736	3	1320
August 29	27	189	0	1	1090	80	97	2	7	11	2	88	19	26	1270	0	2909
August 30	17	130	0	4	1329	27	307	0	8	23	0	25	14	15	2270	0	4169
August 31	3	3	0	0	110	0	50	0	1	0	0	4	1	0	225	0	397
Total	131	390	1407	94	3042	257	1624	51	49	115	5	130	108	77	7693	18	15191

**Changes in the number of contacts per species during "swarming"
(in yellow, the periods when contacts are most frequent.)**

Species	Wintering	Swarming
Common Noctule		X
Leisler's Noctule		X
Common serotin	X	X
Murin de Brandt		X
Alcathoe Murin		X
Murin de Daubenton	X	X
Large wall	X	X
Murin with whiskers	X	X
Murin de Natterer	X	X
Murin ears cut	X	X
Murin de Bechstein	X	X
Barbastelle		X
Common Pipistrelle		X
Pipistrelle by Nathusius		X
Pipistrelle de Kuhl		X
Oreillard sp.		X
Total	7	16

Table 5: Comparison of the number of species in wintering et pendant le « swarming ».

Site 2: Sermaise Careers (91) (siteclosed by a grid)

The activity of chiropractics in the caves of Sermaise, Essonne,, was studied for an 8 months (March to October 2015)) by an automatic ultrasound recording system,, as part of a study commissioned by the General Council of Essonne.. The results show that chiropractics visitwineries all year round, but that it is in October that the activity is strongest.

Month	Number of contacts
March	88
April	80
May	194
June	69
July	45
August	174
September	107
October	499
Total	1256

Evolution of contacts during the annual cycle.

Species	Wintering	Swarming
Leisler's Noctule		X
Common serotin		X
Murin de Brandt		X
Alcathoe Murin		X
Murin de Daubenton	X	X
Large wall	X	X
Murin with whiskers	X	X
Murin de Natterer	X	X
Murin ears cut	X	X
Murin de Bechstein	X	X
Barbastelle		X
Common Pipistrelle		X
Pipistrelle by Nathusius		X
Pipistrelle de Kuhl		X
Oreillard sp.		X
Total	7	15

**Comparison of the number of species in wintering.
et pendant le « swarming ».**

Site 3: Larchant Careers (77) (site opened at the time of the study, but now closed, following our request in 1986...)

The activity of chiropractics of the quarry of Larchant in Seine and Marne, was studied for a month (August2016) by an automatic ultrasound recording system. This study was carried out on a voluntary basis, unlike the department of Essonne, the general council of Seine and Marne does not commission a study on chiropractors...)

22,359 contacts were recorded during The Month of August for 17 species.

Species	Wintering	Swarming
Common Noctule		X
Leisler's Noctule		X
Common serotin		X
Murin de Brandt		X
Alcathoe Murin		X
Murin de Daubenton	X	X
Large wall	X	X
Murin with whiskers	X	X
Murin de Natterer	X	X
Murin ears cut	X	X
Murin de Bechstein	X	X
Barbastelle		X
Common Pipistrelle		X
Pipistrelle by Nathusius		X

Pipistrelle de Kuhl		X
Oreillard sp.	X	X
Great Rhinolophe	X	X
Small rhinolophe	X	X
Total	9	17

Comparison of the number of species in wintering and during swarming.

Site 4: Darvault Careers (77) (protected private site, closed by Nature Research but broken grid...)

The activity of chiropractics of Darvault quarry in Seine and Marne, was studied for a month (August 2016) by an automatic ultrasound recording system. This study was carried out on a voluntary basis, unlike the department of Essonne, the general council of Seine and Marne does not commission a study on chiropractors...)

28,469 contacts were recorded during the month of August, corresponding to 17 species.

Species	Wintering	Swarming
Common Noctule		X
Leisler's Noctule		X
Common serotin		X
Murin de Brandt		X
Alcathoe Murin		X
Murin de Daubenton	X	X
Large wall	X	X
Murin with whiskers	X	X
Murin de Natterer	X	X
Murin ears cut	X	X
Murin de Bechstein	X	X
Barbastelle		X
Common Pipistrelle	X	X
Pipistrelle by Nathusius		X
Pipistrelle de Kuhl		X
Oreillard sp.	X	X
Great Rhinolophe	X	X
Small rhinolophe	X	X
Total	10	17

Comparison of the number of species in wintering and during swarming.

Conclusion

In 1995, we first highlighted "swarming" sites in the Ile de France.

Since 4 sites in total are of exceptional interest to chiropractic, but other sites may be affected, unfortunately, most of these studies were carried out on a voluntary basis, and I do not have enough time to study all the sites that deserve it...

The strong swarming activity implies that the species concerned reproduce in the area: chiropractic surveys around these sites should allow us to better understand the functioning of chiropractic populations..

Unfortunately, again, funding would be needed to carry out time-consuming studies.

The sites located in the Seine and Marne are richer than those of the Essonne, despite lower surveys due to lack of resources.

These results should encourage caution in the management of these sites, because if they are closed by gates in order to avoid visits by unauthorized persons, the monitoring of these sites must be carried out by chiroptologists confirmed according to an extremely strict protocol, avoiding visits too frequent, groups too numerous and especially chiropractic catches because this implies stress to the animals that will probably not return, thus compromising their survival. In this regard, net catches from these quarries appear to be extremely harmful and not compatible with a protection strategy.

This data dramatically improves our knowledge of the status of chiropractic in the Ile de France: the number of species on each site is doubled! Added to the fact that populations are steadily and strongly increasing in these hibernation sites (24 individuals in Etampes in 2012, 328 in 2019!), we can see that our actions for the protection of chiropractics in the Ile de France (started in 1986) are bearing fruit!

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