



Bats swarm where they hibernate

Characterising swarming behaviour and where are the roosts of Bechsteins bats that are coming to swarm in Flanders and Rochefort?

International Bat Conference
Protection of bat populations
Threats, problems, practices, solutions

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Hibernation Maternity colonies Mating / inspecting Hibernation



What is swarming?

- Swarming:
 - Gene flow (Kerth et al., 2001; Veith et al., 2004)
 - Per species specific periods
 - Role of males (Burns & Brothers, 2016;
 - Skewed catchment area (Parsons & Jones, 2003; Furmankiewicz, 2008)
 - Connection Swarming/ Winter (Van Schaik et al., 2015)
 - Method to know which species are using hibernacula



Journal for assessment of reproductive status, age and health in European bats

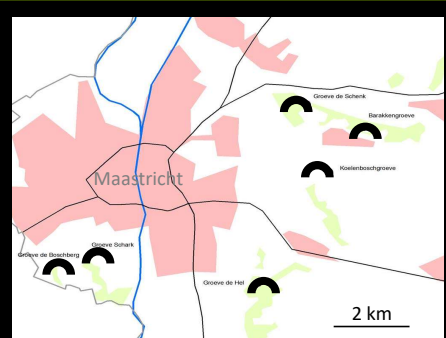
René-Jifke Heersma, Jeroen Thijsbosch and René Janssen

PLOS ONE

RESEARCH ARTICLE
Bats Swarm Where They Hibernate: Compositional Similarity between Autumn Swarming and Winter Hibernation Assemblages at Five Underground Sites

Jeroen van Schaik^{1,2}, René Janssen¹, Thijs Bosch¹, Anne-Jifke Heersma¹, Jasja J. A. Denkers¹, Bart Kranstauber^{1,3}


Swarming sampling




6 of ~ 200 mines

1x per week; 11 weeks

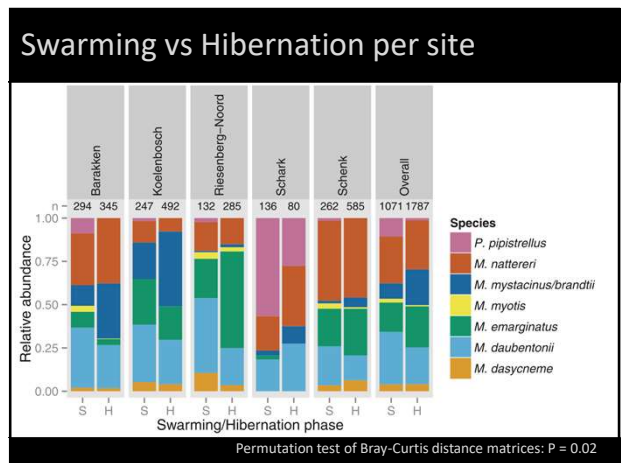
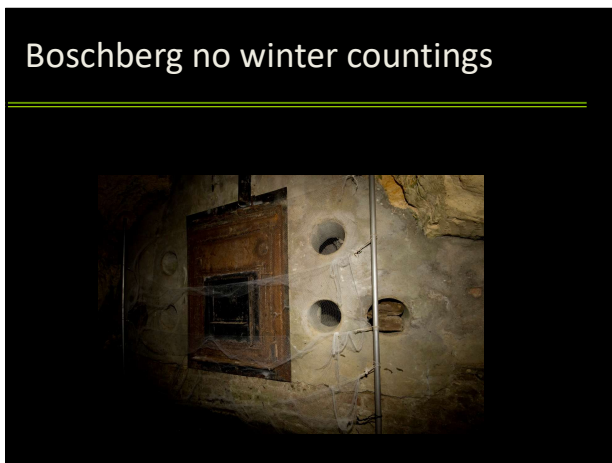
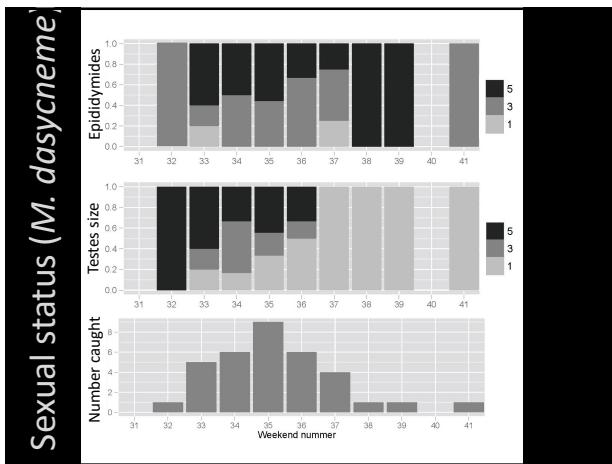
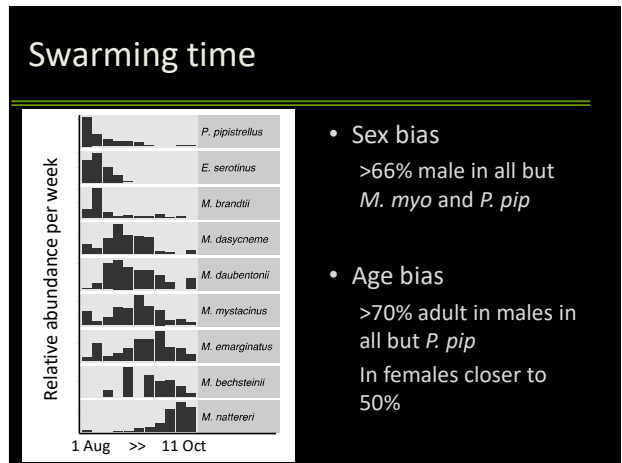
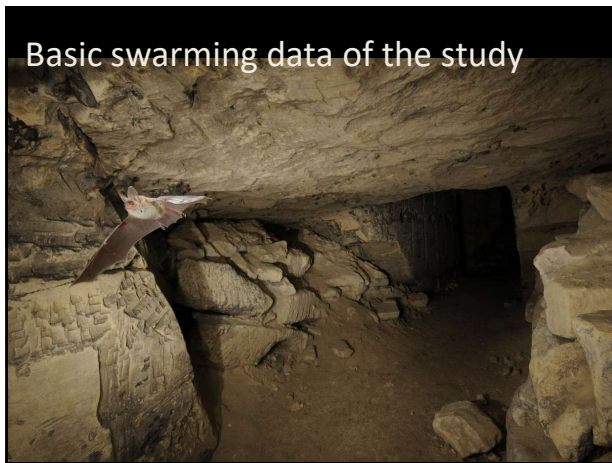
Standardized net setup

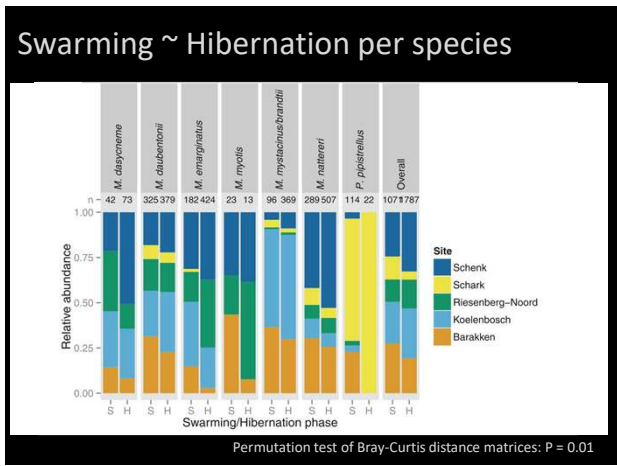


Why in front of quarries?




Countings comparatively accurate (but small sample size)
Lot of quarries forbidden to count by instability






Conservation applications

- Inaccessible & karstic hibernacula
 - Study design important!
 - Enough nights throughout the swarming season
- Species-specific approaches
- Hibernaculum protection outside of winter



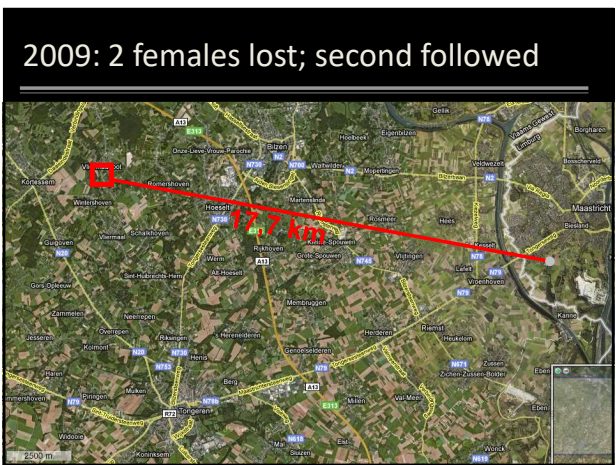
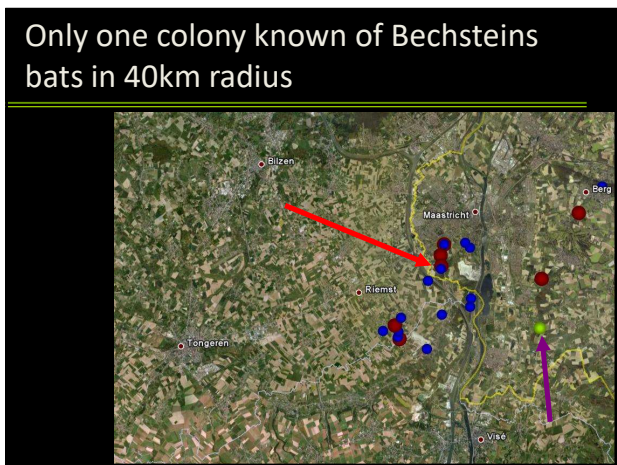
Where are the colony sites of the Bechsteins bats we caught? NL-BE




Acta Chiropterologica, 18(2): 349–358, 2016
 PL ISSN 1508-1109 © Museum and Institute of Zoology PAS
 doi: 10.3161/15081109ACC2016.18.2.004

Swarming behaviour, catchment area and seasonal movement patterns of the Bechstein's bats: implications for conservation

DAAN DEKEULELEIRE^{1,4}, RENÉ JANSSEN², ANNE-JIFKE HAARSMAN³, THUIS BOSCH⁴, and JAAP VAN SCHAIJK⁵

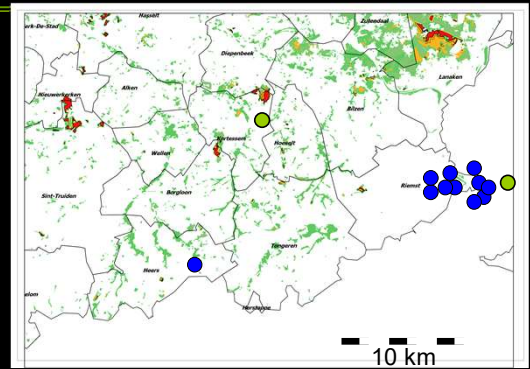


Checking for breeding

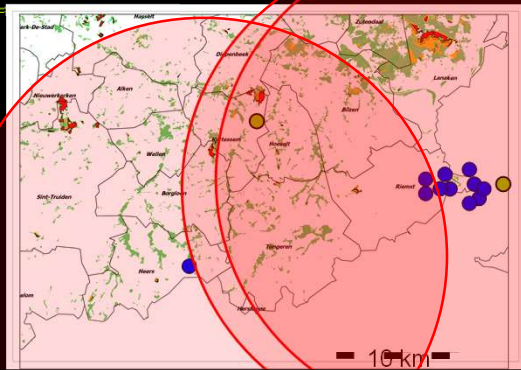
- 2010: juvenile caught
- Tracked back to tree 50m near tree of 2009



Summer 2011- Chance map

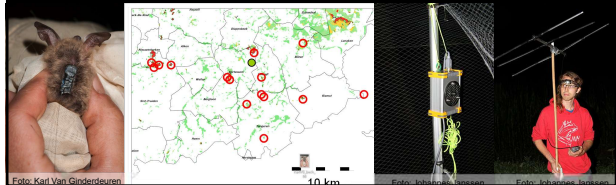


Summer 2011- Chance map 25 km

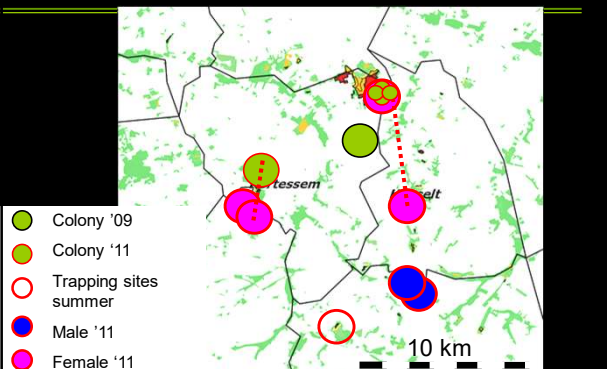


Catching in forest patches

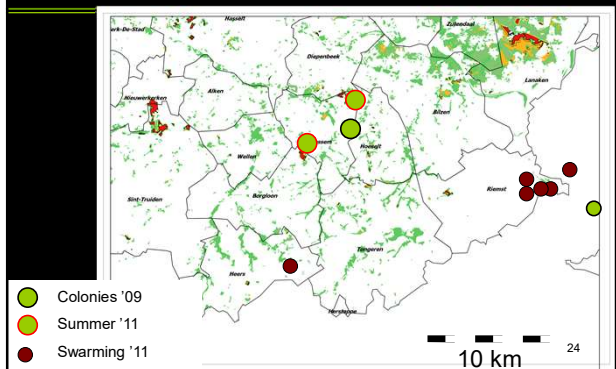
- Lure, nets
- Tracking back



Results summer



Double blind – from swarming to colony roosts



Track them back

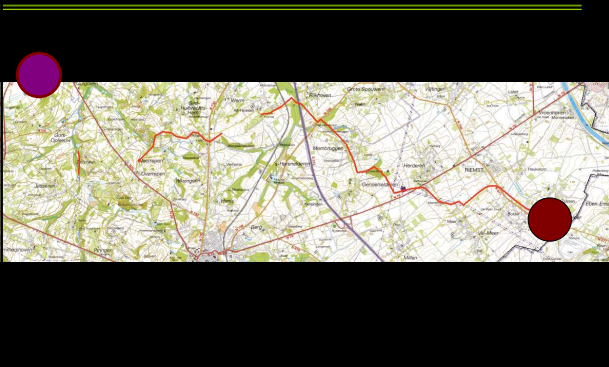
- 19 Bechstein females (adult, sub and YoY)
- 19 (0,45 gram tags < 5 % bodymass)
- 2 gram feed and water
- Following with cars
- Searching in forests
- Airplane tracking



Route 20 (KG → BVN)



Route 14 (LC → BV S)



Route 13 (LC → BVM)



Migration routes

- 3 tagged ('09) + 19 tagged ('11)
 - 1 tag not proper working
 - 3 animal flew in quarry, never found back
 - 18 of 22 back in roosts
- 18 animals (16+2009) crossed the highway
- 7 animals first in quarry
- Foraging in between
- In summer we found breeding again in forest patches



Cachtment area

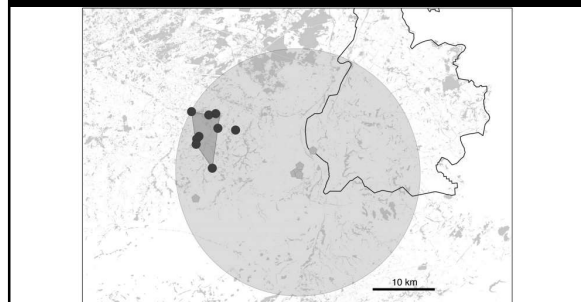
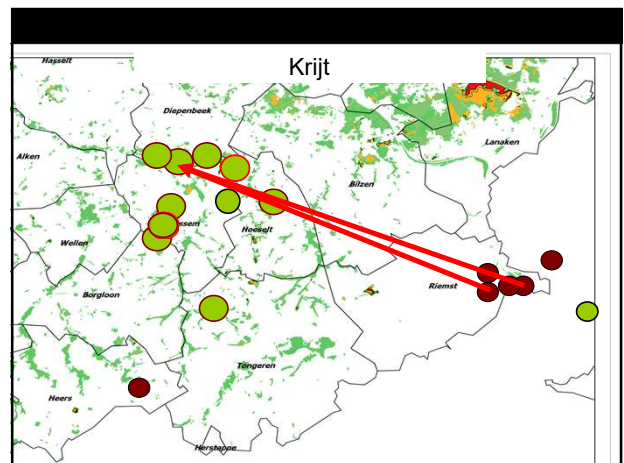
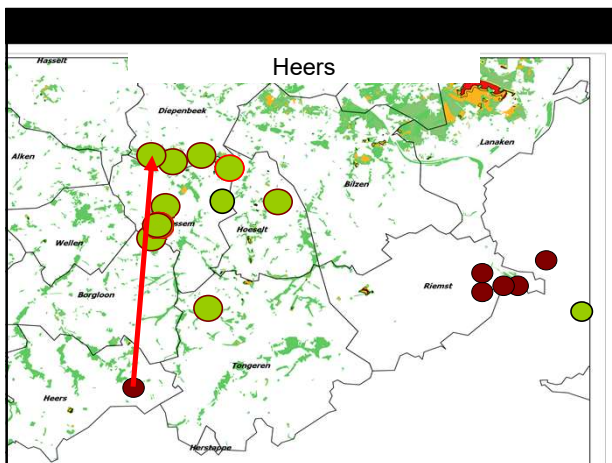
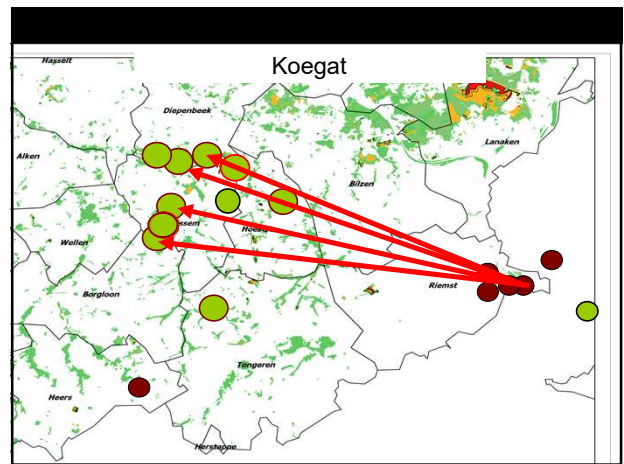
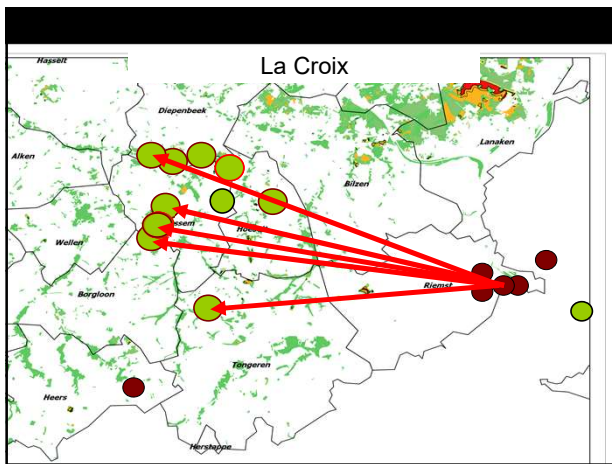
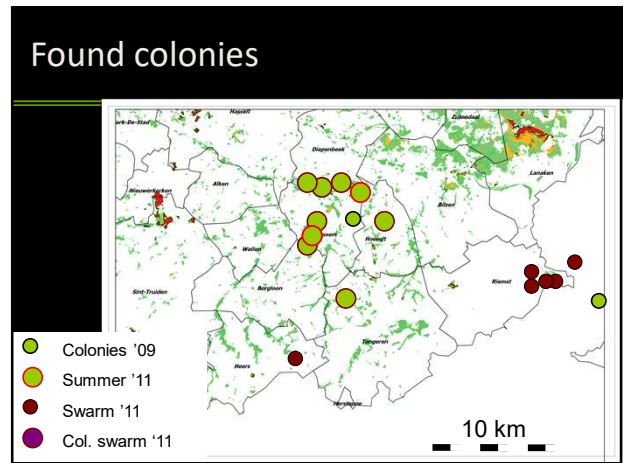


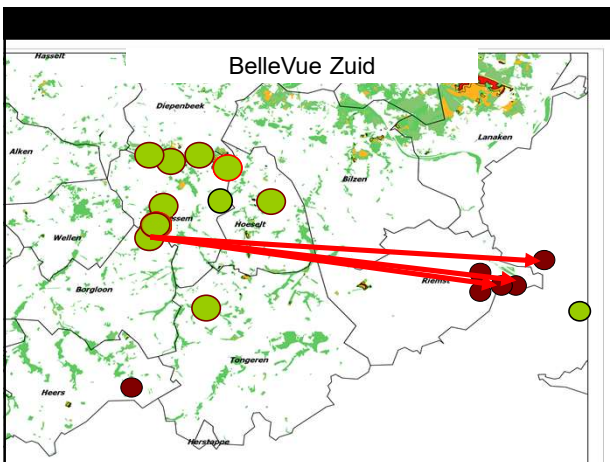
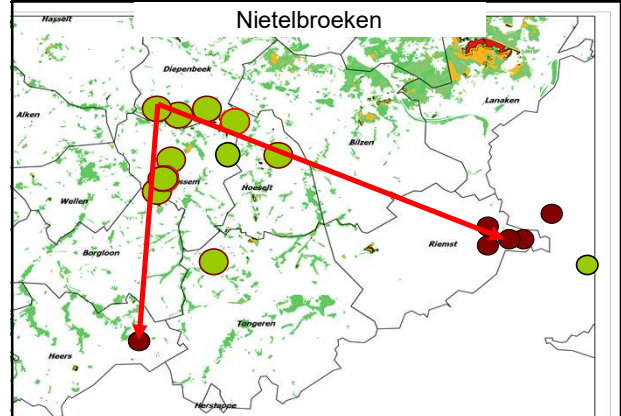
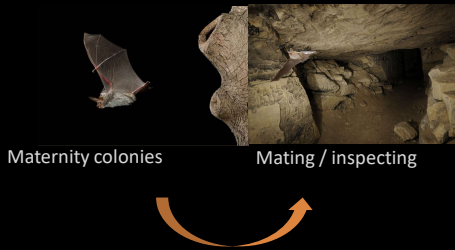
FIG. 2. Map showing the minimum catchment polygon (dark grey), and maximum range circle (light grey) of the two main swarming sites (LA, KG). Country border between Belgium and the Netherlands (irregular black line), forest fragments (irregular grey patches), swarming sites (grey pentagons) and recovered roost sites (black dots) are also indicated

Origin

Mating / inspecting Maternity colonies



One or more swarming sites per colony?



Conclusions

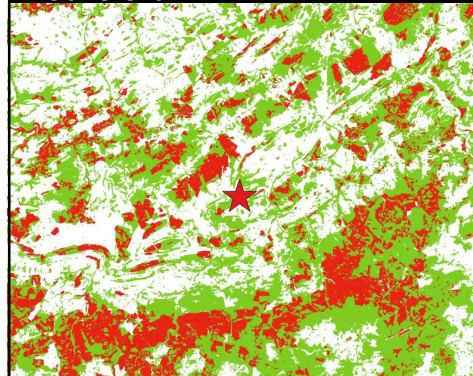
- Tracking back from swarming is a good method to find Bechsteins colonies and double blind
- Most ancient forest is gone by deforestation; afterwards new forest that is unsuitable for this species
- Colonies are using several swarming sites; swarming sites be visited by several colonies.

Where are the colony sites of a huge Bechsteins swarming site in Rochefort?

Winter countings (Source: PLECOTUS/DEMNA)

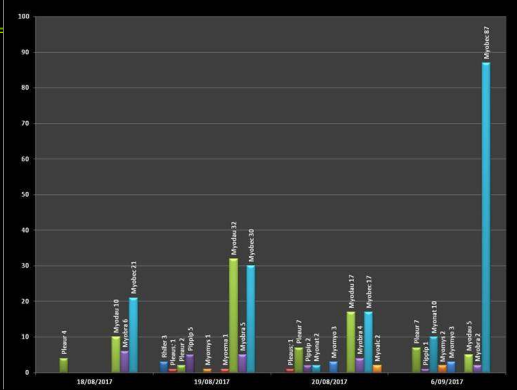
Species	2007	2009	2011	2012	2014	2015	2016	Total
Myotis bechsteinii	1	2			1	20	3	27
Myotis dasycneme						1		1
Myotis daubentoni			7		3	12	6	28
Myotis emarginatus	41	3	21	70	8	29	11	183
Myotis Myotis	3	2	5	1	5	7	5	28
Myotis mystacinus/brandtii	5	35	48	9	54	48	39	238
Myotis nattereri	1	2	4	2	6	7	5	27
Plecotus sp.		1						1
Plecotus auritus			1		2	1		4
Rhinolophus ferrumequinum			1	1	3	3	2	10
Rhinolophus hipposideros			1	1	2	2	4	10
Myotis sp.			1		1	3	1	6
Total	51	43	91	84	85	133	76	563

Ancient and recent forests around Rochefort...

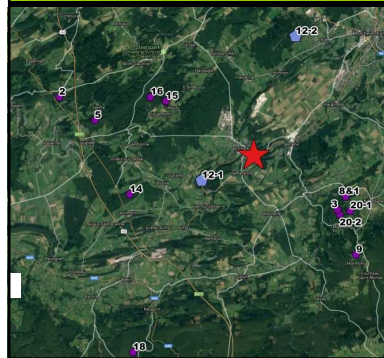


The swarming site (red star). Ancient forest (red); younger forest (green) (Kervyn, 2011).

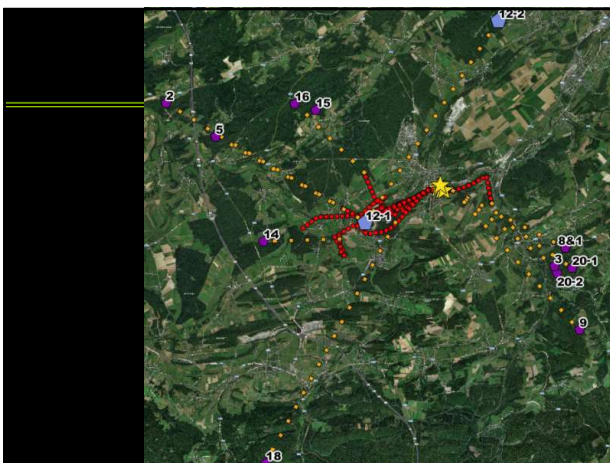
87 Bechsteins in 2 hours...



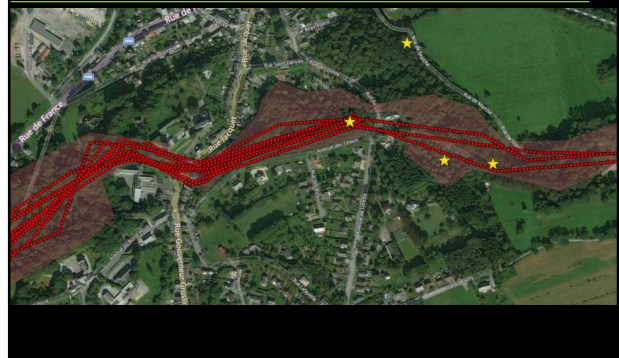
Found roosts



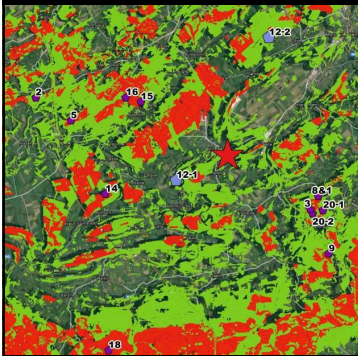
The swarming site (red star) and its catchment area with Bechsteins females (purple, without 14), juvenile male (purple 14) and Alcathoe bat (light blue).



One busy road next to the swarming site



Found colonies in ancient forest



The swarming site (red star) and its catchment area with Bechsteins females (purple, without 14), juvenile male (purple 14) and Alcathoe bat (light blue).

Ancient forest (red); younger forest (green) Kervyn (2011)

Tracking back

- 4 out of 5 Bechsteins tags back could be tracked in August;
- 0 out of 3 of female *M. brandtii* and 1 out of 1 of *M. alcathoe*.
- During the September session we found 6 out of 11 tagged Bechsteins back.
- The swarming site has a catchment area of 162 km².

Results - 2

- We found a dead oak with the tag of *M. alcathoe*, but at this location we observed no outflying bats. Probably the tag dropped off.
- Some bats certainly stayed the first night in the cave and flew back in the following nights.
- The furthest Bechsteins bat came from 15 km away to swarm
- Bech3 could be a colony member of Bech20, Bech8 and Bech1 were found in the same tree. Maybe 15 and 16 are colony members too.



Conclusions Rochefort

- Rough and hilly terrain makes tracking difficult but possible; airplane tracking helps a lot
- Big yagis (6 elements are important to track animals back to colonies)
- *M. brandtii* tracking back in swarming phase looks impossible. This were also the results in Germany (pers comm. Christian Dietz) and The Netherlands (own unpub. data).
- Bechsteins bats are roosting only in forests that have been constantly wooded since 1775. This is also already concluded by Napal et al. (2013) and underlined by Dekeukeleire et al. (2016).

Thank you

Coauthors:

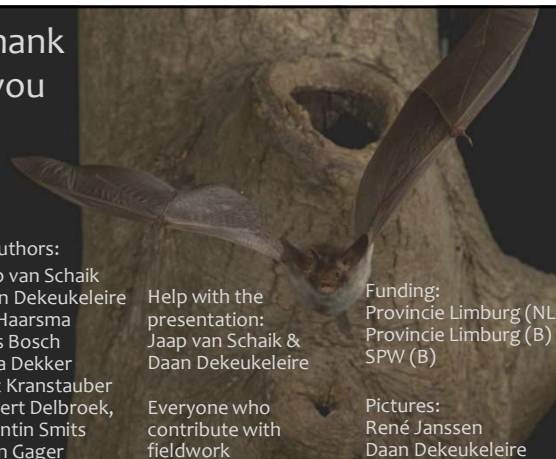
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Questions?

