Gemeente Utrecht

Bats in Utrecht

I BAT BOXES

II HOPPING DETECTOR

Background

Protection of all bat species under EU law

Urban areas fall within the range of bat habitats

Mitigation & Compensation Measures

Habitat Directive Annex IV

→ Protection in entire range

→ „entire range" includes urban areas

→ Urbanisation process

→ Sustainable city development
Accessibility of urban habitats

Bat Box Project

Lack of natural sites for tree roosting species

→ Accessibility of urban habitat

Roost/ Habitat protection

→ Mitigation/ Compensation tool

2011: 275 boxes (1FF & 2F)
10 parks

Evaluation 2011-2014: **Box position**

- Tree species
- Tree thickness
- Box height
- Box exposition
- Flightspace
- Distance to path
- Distance to forest

→ No significant influence on box inhabitation

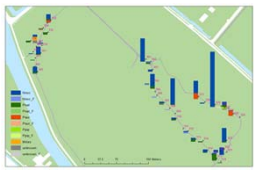
Evaluation 2011-2014: **Location**

Some parks were inhabited almost instantly

Others are still not inhabited

?

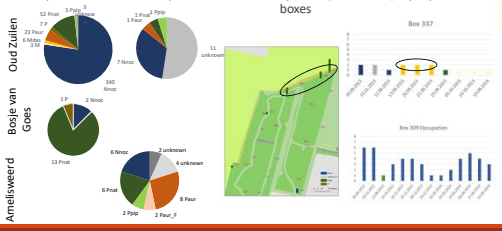
Presence of natural roosting sites
→ More boxes?
Presence of roosting bat population
→ Longer initiation phase?
Size of park, tree species, age of park
Connectivity



Evaluation 2011-2014: **Species**

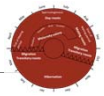
Species' domination of parks

Species' (individuals) loyalty to boxes



Date	Species	Box No
16.09.2014	P	009
19.09.2014	P	009
20.09.2014	Pnat	009
01.10.2014	P	009
02.10.2014	P	009
03.10.2014	P	009
07.10.2014	P	009

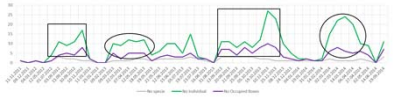
Evaluation 2011-2014: Seasonality



Occupation March – November
(exceptions proof the rule)

Peak in autumn
- Groups
- More boxes occupied

Peak in spring



Background

Protection of all bat species under EU law

Urban areas fall within the range of bat habitats

Mitigation & Compensation Measures

→ knowledge on habitat use

Legal obligation

Habitat Directive
Annex IV

Protection in entire range

„entire range" includes urban areas

Urbanisation process

Sustainable city development
Accessibility of urban habitats

Study background

Seasonality:

Complex annual reproductive cycle

April-June	Pregnancy (A)
July-August	Lactation (B)
September-October	Post-lactation (C)

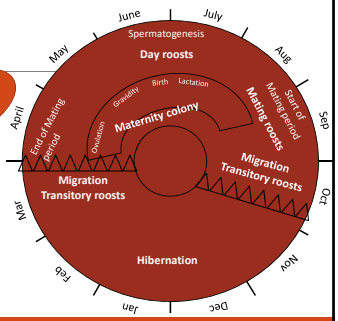
Complex ecology

Range:

Complex network of roots and habitat patches

Roots (maternity, mating, temporary, hibernation)

Habitats (mating territories, foraging, flightpaths)



Study aim

Which environmental structures affect species richness & are there seasonal differences?

More urban green – more species

Higher density of build-infrastructure – less species

Positive correlation of woods with species numbers & activity

What are species specific habitat requirements?

Can we detect variation in habitat use on a spatial scale?

Does seasonality affect habitat use?

Ppip prefer structured landscape

Habitat use varies between species, season and on a spatial scale

Habitat variables affect species activity

Eser forage open area

Importance of gardens

Methods

Study sites
- Citizen science project 2013
- 73 locations

Recording of bat activity
- 2 batlogger (12sec = 1 passage)
- 15th April – 30th October
- No precipitation, > 8°C

→ Mean activity of recording nights per period (A-C) and location (1-73)

→ Sufficient species data when ≥ 5 recordings for ≥1 period

April-June	Pregnancy (A)
July-August	Lactation (B)
September-October	Post-lactation (C)

Methods

Habitat variables
- Bufferzones of 100m, 250m & 500m
- Mapping structures

→ Extract percentages of cover / No. of elements / categories for each location and Bufferzone

I. Buildings
II. Sealed ground
III. Private land
IV. Open land
V. Wooded area
VI. Waterbodies
VII. No. of Streetlamps
VIII. No. of Trees
IX. No. of potential roosting sites
X. Noise

Results

Species richness

Total record of 10 species

1-8 species per study site, mean 3.29 (± 1.65)

→ **no clear spatial pattern**

→ *Myotis spp.* only in outskirts

Pooled species set: only opportunistic/tolerant species

Results

Buffer 500m high autocorrelation → Analysis with Buffer 100m & 250m

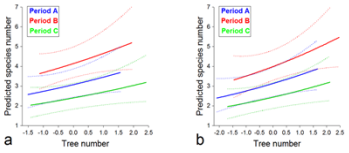
Species richness

No. of trees and survey period explain variance in species numbers

- Model selection, ranked using AICc
- GLMs with Poisson error dist. & log-link function

→ **In all periods & on both scales**

no. of species increased with no. of trees



No effect of streetlights

No effect of noise

No effect of sealed ground

Results

Variation on spatial scale

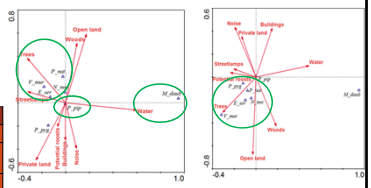
P. pipistrellus tolerant on both scales

M. daubentonii differs from other species

Most species plotted near vector no. of trees

→ slight variation in habitat use on a spatial scale

	100m	250m
N. noctula	woods	Open land
P. pygmaeus	More distinct (private land)	Less distinct (trees)
E. serotinus	Streetlamps	Trees/ open land



Results

Variation on temporal scale

Overall species activity highest in period B

Data on *P. pipistrellus, P. nathusii, N. noctula* for all periods

P. Pipistrellus shows no seasonal change in habitat use

N. Noctula shows seasonal change

High energy demand during lactation → insect abundance at water?

When looking at seasonality, spatial patterns are detectable

N. noctula	100m	250m
A	Open land	woods
B	water	
C	woods	woods

Conservation implications

Urban environment for **tolerant** & **opportunistic** species

Specialised species only occur infrequently in suburbs

Absence of species entails information on accessibility of urban habitat

Networks of **trees** / single trees mitigate urbanisation effects

→ provide foraging habitat, orientation structures, windshields, roosts

Importance of **green** structures throughout city

→ bats are mobile and use wide network of habitat patches

Seasonality to be considered in urban planning

Thank you for your attention!