



Bats and invertebrates provide evidence of ecoducts' role as key elements of the Green Infrastructure

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Integrating
Transport Infrastructure
with Living Landscapes
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What Green Infrastructure is

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A strategically planned

- network of natural and semi-natural areas with other environmental features
- designed and managed to deliver a wide range of ecosystem

Communication from the Commission :Green infrastructure (GI) .Enhancing Europe's Natural Capital (COM/2013/0249 final)

http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

An example:

Green Bridges/
Ecoducts





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The C37 road: Vic - Olot



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- 19 km long
- Traffic level circa 6000 vehicles per day
- Operation begun in 2009

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The C37 road: Vic - Olot



Video - Drone images by Minuartia - Hemav



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The monitored ecoduct



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The ecoduct was completely restored

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Perfectly integrated on the surroundings.
Reduced the need for transporting excavated materials:
save time, money ... and carbon dioxide emissions!



Cattle help vegetation control



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Objectives

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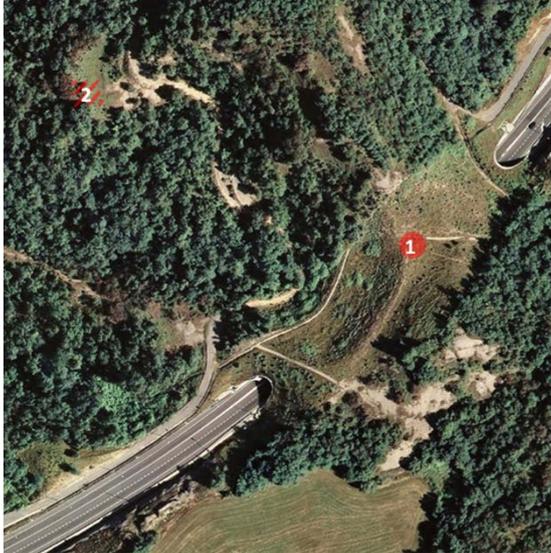
To investigate the use of the ecoduct as a **wildlife crossing** but also as a **wildlife habitat**.

Monitoring of different taxa. Period 2014-2015.

For the purposes of this talk **we will focus on:**

- **Invertebrates and**
- **Bats**

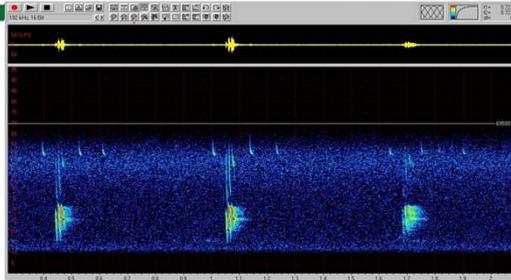




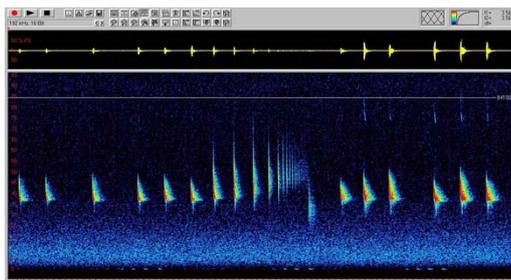
Methods

Spring

- 2 ultrasound recording stations
- Automatic bat detectors *Wildlife Acoustics* with *SMS-Us* microphones
- One in the ecoduct, another in the surroundings
- Simultaneously recording:
3 hour during sunset and night
22 consecutive nights



Pipistrellus pygmaeus - Social calls



Pipistrellus pygmaeus - Hunting calls

Species identification

Number of registrations
obtained by the analysis of
ultrasounds

Sonobat and *Avisoft SASLab
Pro* software





Results - Bats

Species	Surroundings	Ecoduct
<i>Rhinolophus ferrumequinum</i>	-	3
<i>Rhinolophus hipposideros</i>	-	2
<i>Myotis myotis</i> i/o <i>Myotis blythii</i>		
<i>Myotis emarginatus</i>	-	2
<i>Myotis daubentonii</i> i/o <i>Myotis capaccinii</i>	-	1
<i>Pipistrellus pipistrellus</i>	41	564
<i>Pipistrellus kuhlii</i> i/o <i>Pipistrellus nathusii</i>	90	1305
<i>Pipistrellus pygmaeus</i> i/o <i>Miniopterus schreibersii</i>	3	10
<i>Hypsugo savii</i>	5	81
<i>Nyctalus leisleri</i> i/o <i>Eptesicus serotinus</i>	26	614
<i>Barbastella barbastellus</i>	-	4
Unidentified	4	17
Total		
Registers	169	2606
Minimum number	5 species	11 species

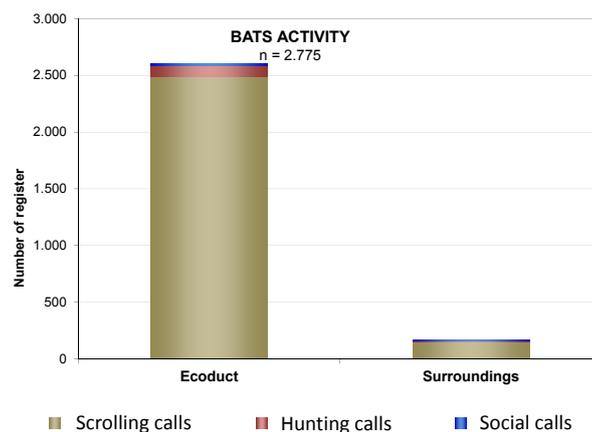


Xosé Fernández Bou



Results - Bats

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A funnel effect of the ecoduct is suggested



Invertebrates



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Methods

3 areas in the ecoduct

- 27 sample points (under stones and wood; captured with entomology aspirators)
- 9 transects 10 m long; captures with nets.



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Results - Invertebrates



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179 taxa identified

(Work is still in process)



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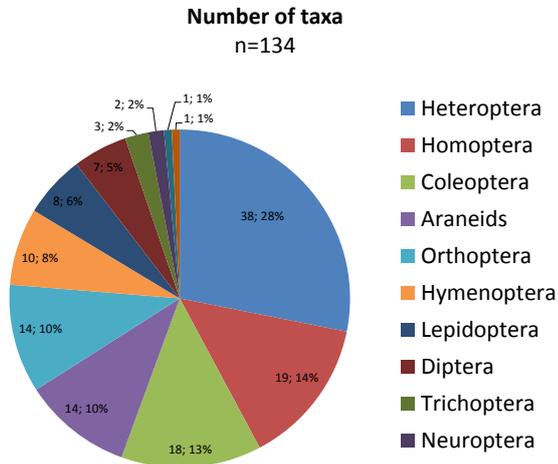
Photos by Minuartia



Results - Invertebrates

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In the vegetation: 134 different taxa



Orthoptera



Lepidoptera



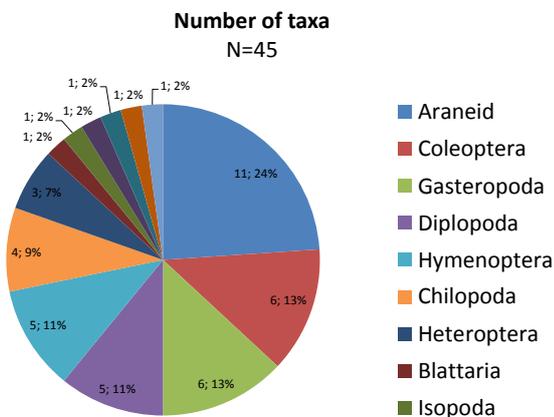
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Results - Invertebrates

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In the ground: 45 different taxa



Araneid



Coleoptera



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The ecoduct provide an habitat
to a high diversity of invertebrates
Pollinators benefit from the restored
grassland



Other species detected in two ecoducts Amphibian and reptiles: 5 species



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Photos by Minuartia





Birds: 42 species (two nesting)



Small mammals: 2 species

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Rabbits, carnivores, ungulates: 9 species



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Key messages

- A well designed (and properly managed) ecoduct provides wildlife crossing opportunities but also habitats for a wide range of species.
- Further research on their role for wildlife and the influence of management practice is encouraged.
- Ecoducts must be considered important elements in the Green Infrastructure networks and the benefits are so great that they must outweigh the cost.

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Thank you very much
for your attention

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