First results from Yellow-bellied toad's (Bombina variegata) radiotracking in forest landscape

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Species

Name : Yellow-bellied toad

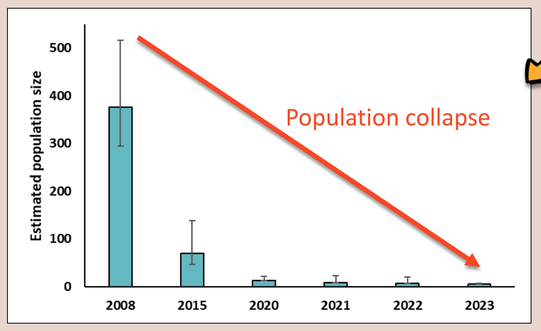
Distinguishing features :

- brown pustular back
- ♥ shaped pupils
- rounded snout
- yellow belly with black spots

Background

Size of the last Ardennes **population very small**[1]

Supplementation program planned



Need for **preliminary studies**, particularly on habitat use during and outside the breeding season

→ **radiotracking**

Transmitters outfitting on toads in a healthier population

Aim of the study: better understand habitat use, particularly the terrestrial habitat during and outside the breeding season

Materials

Radiotracking

Toads fitted with transmitters[2] at two different times: **Spring** and **Summer**

15 toads: 7♂ and 8♀ 14 toads: 7♂ and 7♀

Locations : **2 times a day** (day and night) **every day** for 25 days and 22 days

Weather measurement at the start of each session :

Temperature Atmospheric pressure Humidity Rainfall

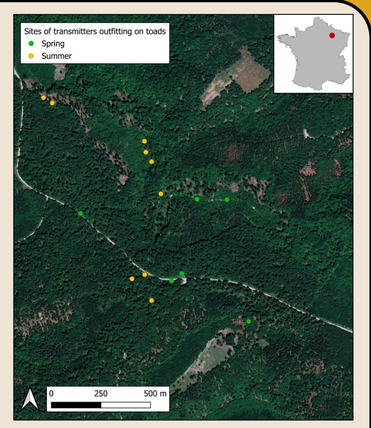
If location in terrestrial shelter, **measurement of micro-habitat structural components**:

Holes presence Water presence Tree cover

Substrate Woody fragments cover Distance to water

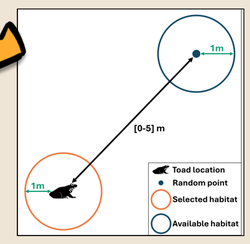
within a 1m radius around the location point: **selected habitat**

and around a random point created within a 5m radius of the location: **available habitat**[3]



Toad fitted with transmitter

Analysis



Habitat use

Habitat = binary variable: aquatic (A) or terrestrial (T)

Comparison of **A/T use between seasons**

Comparison of **A/T use between sex in each season**

→ Fisher exact test

Effect of weather on habitat use : **GLMM** with individuals as random effect

A/T ~ weather + random_effect

Movements

Movement = difference in location between two consecutive points (except within the same aquatic site)

Comparison of **average movement distance between male and female in each season**

→ Student's t-test with paired data

Effect of weather on movements occurrence : GLMM with individuals as random effect

Movement ~ weather + random_effect

Terrestrial habitat selection

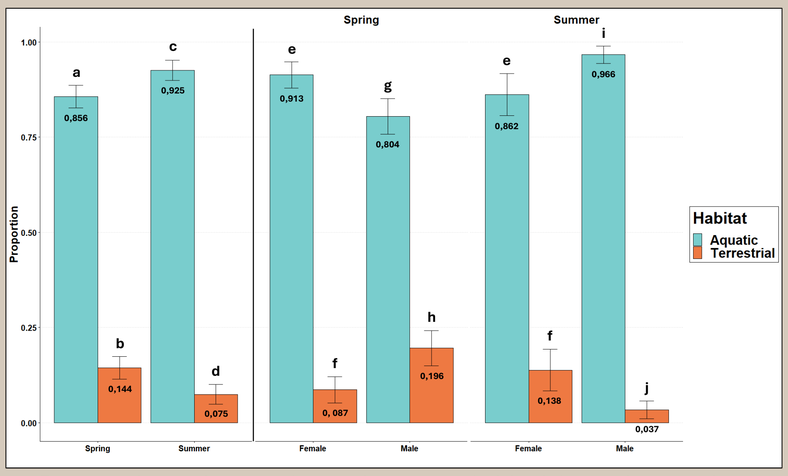
Effect of terrestrial shelter structural components on habitat selection : GLMM with individuals as random effect

Explained variable = Toad's presence

Toad_pres ~ structural components + random_effect

Results

Habitat use



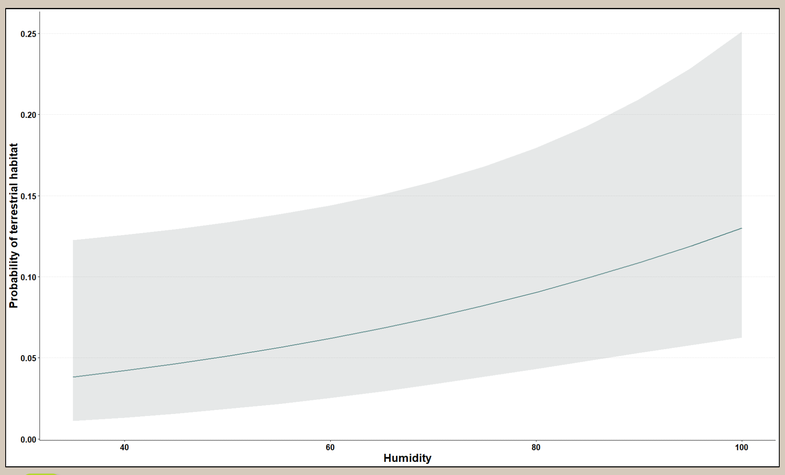
Proportion of aquatic and terrestrial habitats for each season and each sex in both seasons.

♀ / ☀ difference (*p-value = 0,001*)

♂ / ♀ difference (*p-value = 0,0003*)

Difference between spring and summer is due to different habitat use for male in both season (*p-value = 4,52e-09*).

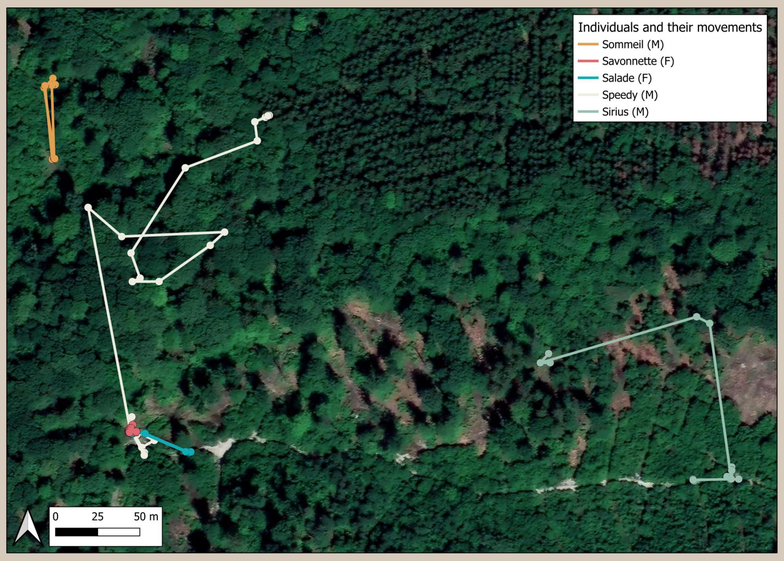
Link with the weather :



♀ more chance of **terrestrial habitat in wet weather** (*p-value = 0,033*)

☀ no observed effect of weather on habitat use

Movements

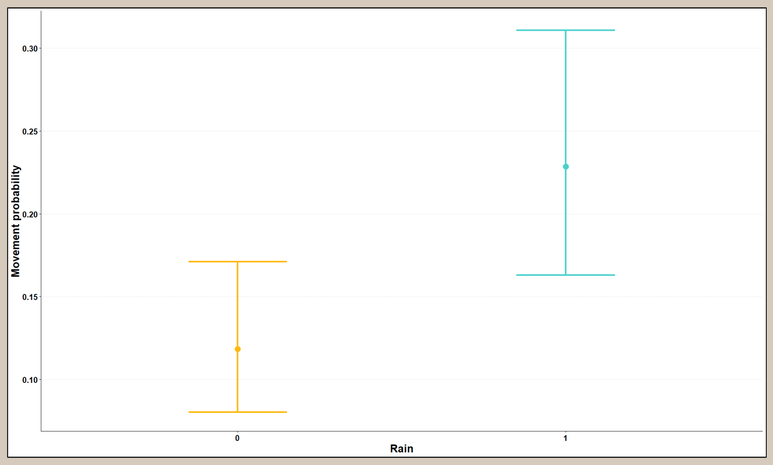


Example of movements for 5 individuals :
2 females (F) and 3 males (M)

♀ Difference in average movement distance between males and females (*p-value = 0,004*)

♂ 5,16 m ♀ 1,81m

Link with the weather :



More chance to observe a **movement when it rains** (*p-value = 2,09e-05*)

Terrestrial habitat selection

Examples of terrestrial shelters used by Yellow-bellied toad

Proportion of locations in terrestrial shelters:

♂ 65,6% ♀ 34,4%

♀ 87,5% ☀ 12,5%

Structural components with an effect on terrestrial shelters selection:

holes presence **woody fragments cover**

Yellow bellied toad generally chose **terrestrial shelters with holes** (*p-value = 0,009*) and **high level of woody fragments cover** (*p-value = 0,01*)

Conclusion

Even though inter-individual variability seems very marked in habitat use and movements, our first results suggest that some individuals of Yellow-bellied toad regularly use terrestrial habitat, especially males at the early breeding period. This habitat use and the associated movements are mainly observed during wet weather, and the selection of terrestrial shelters is based on criteria allowing the preservation of humidity.

References

1. Le Barh, M. & Alleman, C. *Suivis et Conservation Du Sonneur à Ventre Jaune (Bombina Variegata L.) En Forêt de La Croix-Aux-Bois (08), et En Argonne*. 50 (2023).

2. Holohil Systems. BD-2X Transmitter. https://www.holohil.com/transmitters/bd-2x/.

3. Hinderer, R. K., Litt, A. R. & McCaffery, M. Habitat selection by a threatened desert amphibian. *Ecology and Evolution* **11**, 536–546 (2021).