



**HAL**  
open science

## Is Citizen Science an Effective Tool for Lyme Borreliosis Surveillance ?

Thierno Bah Madiou, Jonas Durand, Arnaud Cougoul, Thomas Optiz, Pascale Frey-Klett, Elena Arsevska, Francesca Dagostin, G.R. William Wint, Xavier Bailly, Karine Chalvet-Monfray

### ► To cite this version:

Thierno Bah Madiou, Jonas Durand, Arnaud Cougoul, Thomas Optiz, Pascale Frey-Klett, et al.. Is Citizen Science an Effective Tool for Lyme Borreliosis Surveillance ?. 23. European Society for Vector Ecology Conference, Oct 2024, Montpellier, France. , pp.241, 2024, Book of abstracts - 23rd European Society for Vector Ecology Conference. hal-04759876

**HAL Id: hal-04759876**

**<https://hal.inrae.fr/hal-04759876v1>**

Submitted on 30 Oct 2024

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License

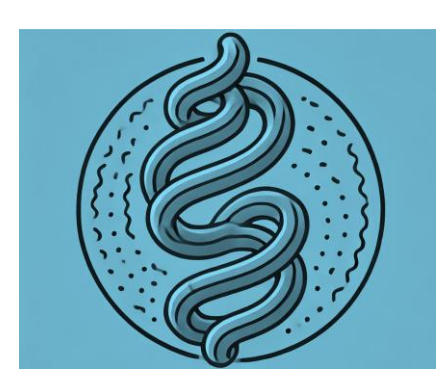
Bah Madiou Thierno<sup>1,2</sup>, Durand Jonas<sup>3</sup>, Cougoul Arnaud<sup>1,2</sup>, Optiz Thomas<sup>4</sup>, Frey-Klett Pascale<sup>3</sup>, Arsevska Elena<sup>5</sup>, Dagostin Francesca<sup>6</sup>, Wint William<sup>7</sup>, Xavier Bailly<sup>1,2</sup> and Karine Chalvet Monfray<sup>1,2</sup>

<sup>1</sup> UMR 0346 EPIA, INRAE-VetAgro Sup, Université Clermont Auvergne, 63122 Saint-Genès-Champagnelle, France  
<sup>2</sup> UMR 0346 EPIA, INRAE-VetAgro Sup, Université de Lyon, 69280, Marcy l'Etoile, France  
<sup>3</sup> UMR 1136, INRAE-Nancy, Université, Interactions Arbres/Microorganismes, 54280 Champenoux, France  
<sup>4</sup> UR 546, INRAE, 84914 Avignon, France

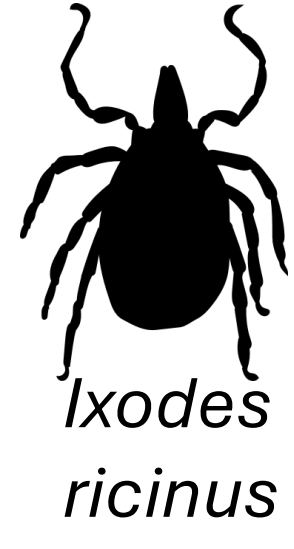
<sup>5</sup> UMR ASTRE, CIRAD, Campus International de Baillarguet, Montpellier, France  
<sup>6</sup> Research and Innovation Centre, Fondazione Edmund Mach, San Michele all'Adige (TN), Italy  
<sup>7</sup> Environmental Research Group Oxford Ltd, Oxford, United Kingdom

## Context

Lyme borreliosis (Lb) is the most prevalent vector borne disease in France

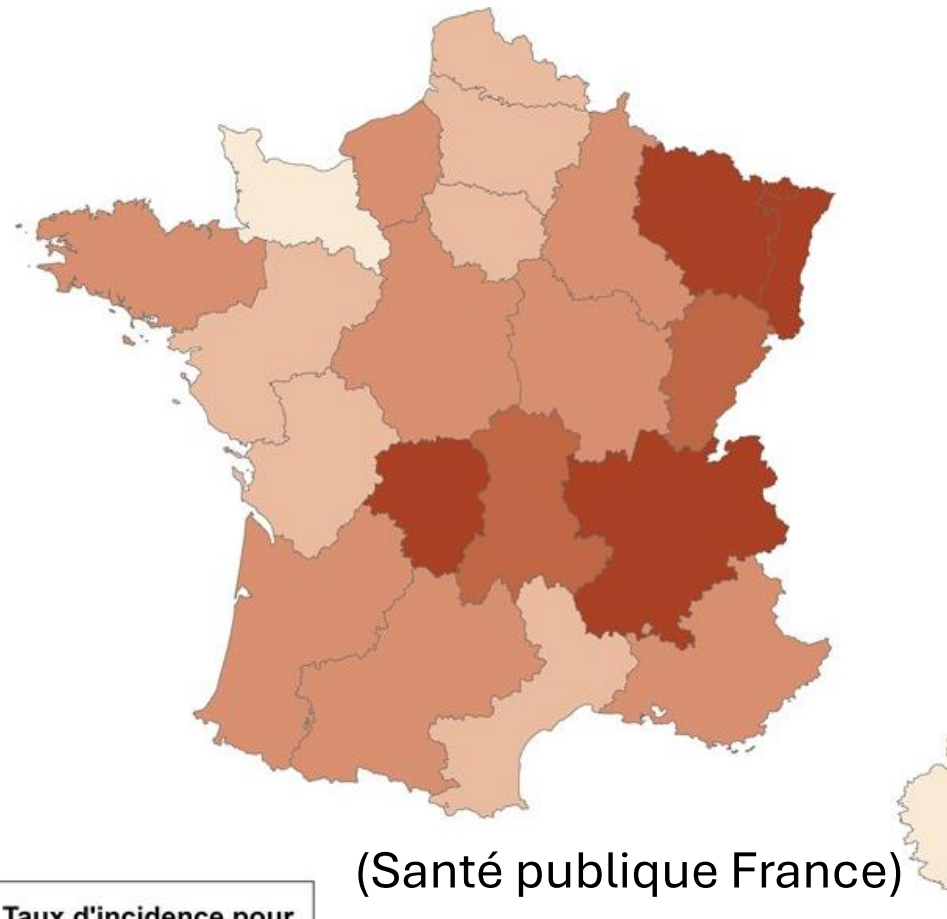


+



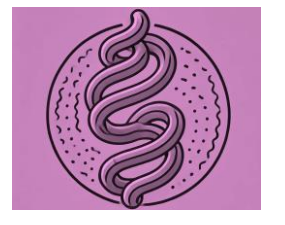
=

47 000 cases in 2021



(Santé publique France)

Most frequent species in Europe



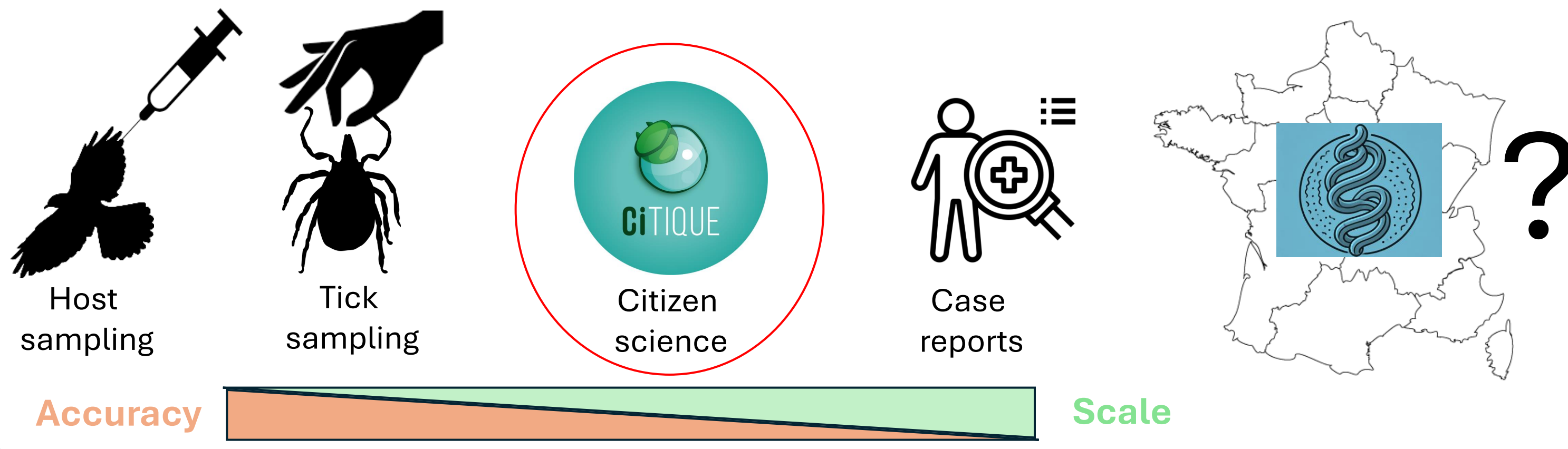
*Borrelia afzelii*



*Borrelia garinii*

Monitoring Bbsl distribution is important for risk prevention

Different methods to monitor Bbsl distribution



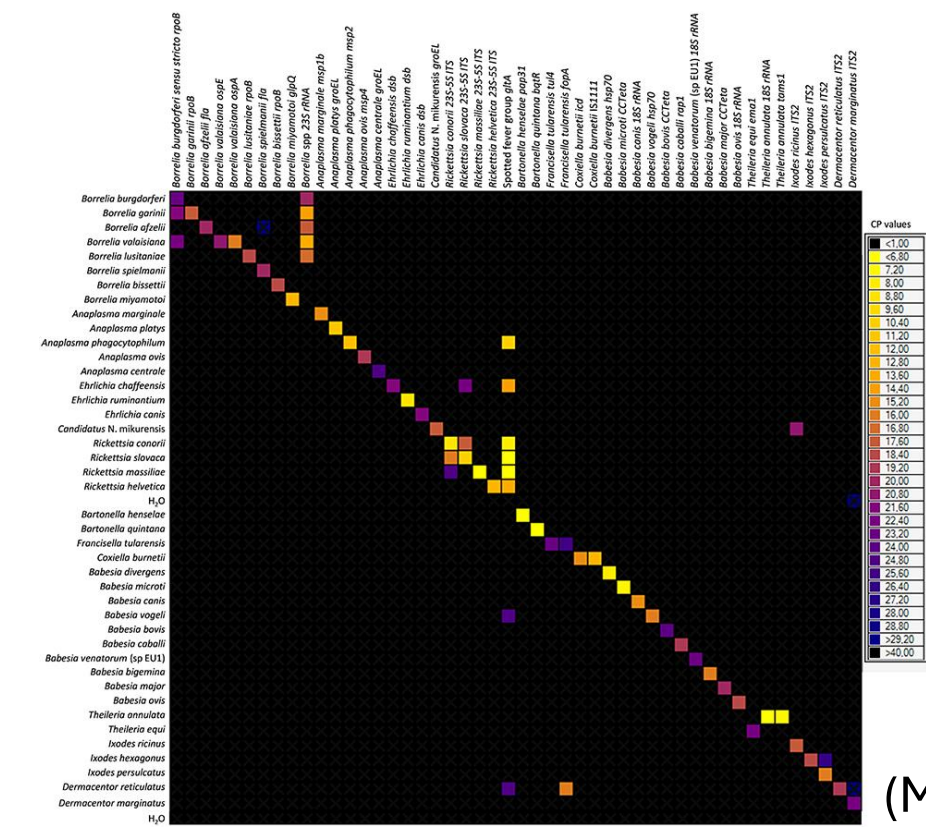
**Aim** : Identify factors associated with the distribution of Bbsl genospecies in Continental France

## Methods

Ticks screening for *Borrelia sensu lato*



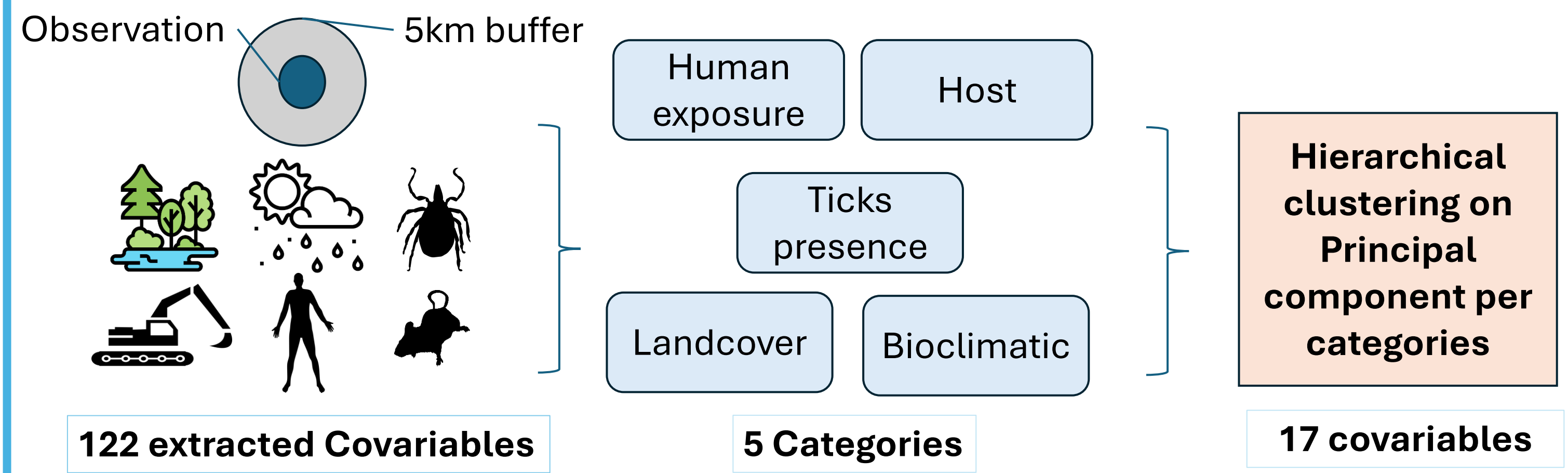
1887 biting *I. ricinus*



BioMark dynamics Systems

(Michelet et al., 2014)

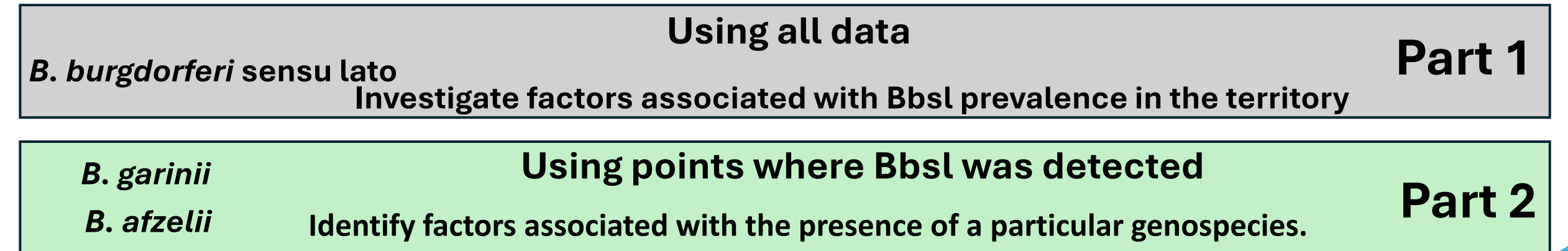
Covariable extraction / selection



GAM models

**Formula** *Borrelia* ~ Selected covariables + constrained gaussian process on coordinates

Two part modeling



## Bbsl Distribution

Most sampling done in the Northern part of the country

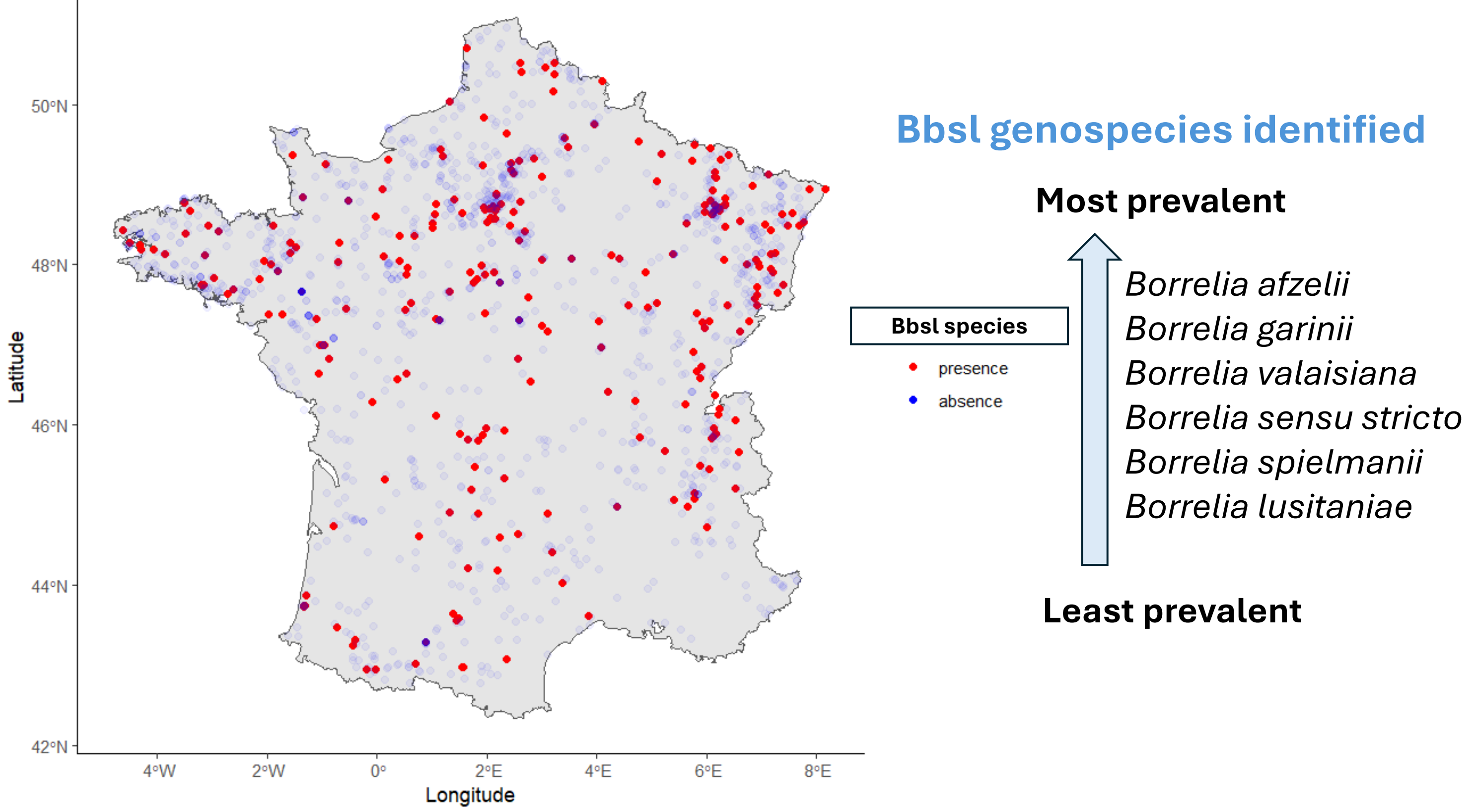


Figure 1 Original location of the ticks sent for pathogens identifications across the French territory.

## *B. afzelii* and *B. garinii* prevalence and associated factors

### *Borrelia afzelii*

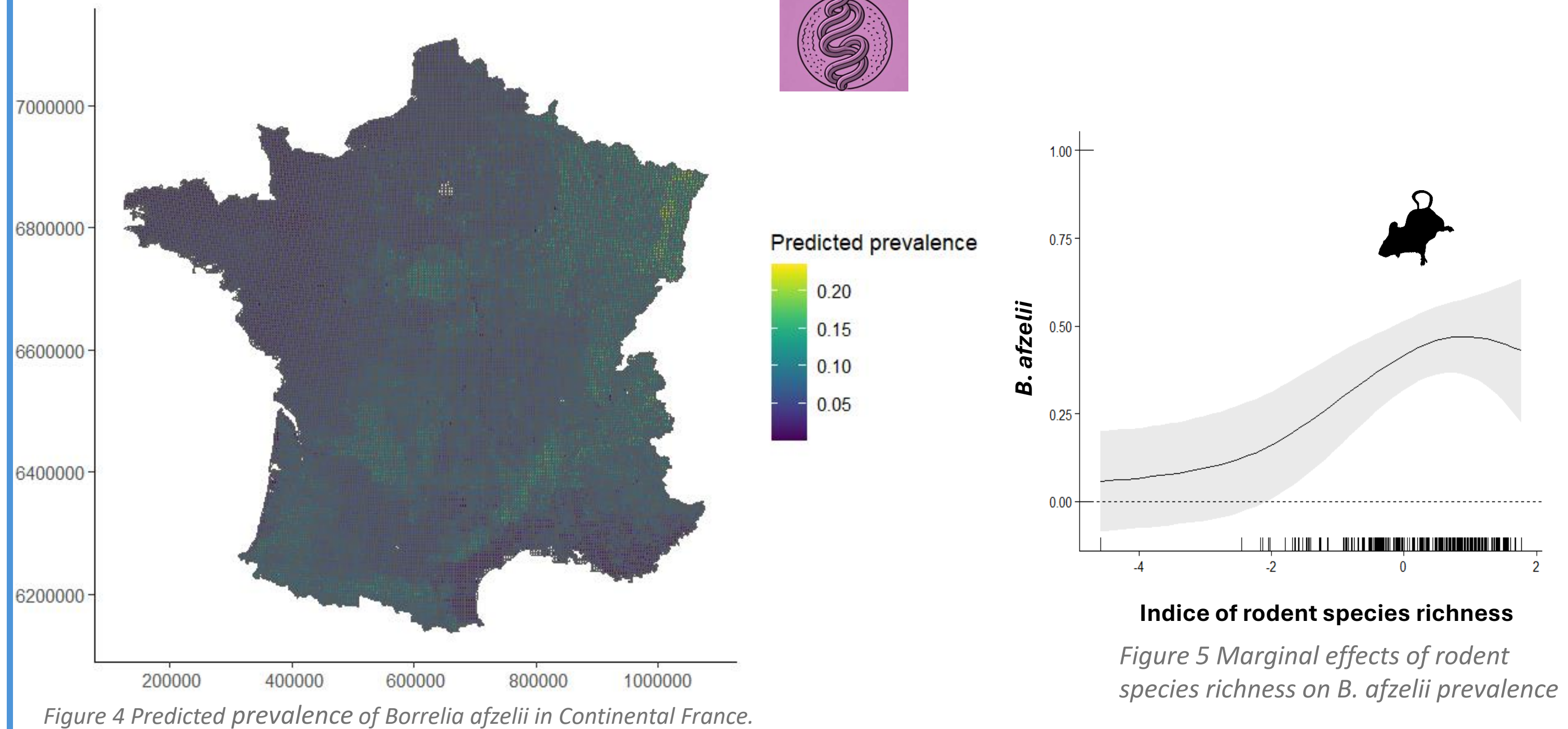


Figure 4 Predicted prevalence of *Borrelia afzelii* in Continental France.

### *Borrelia garinii*

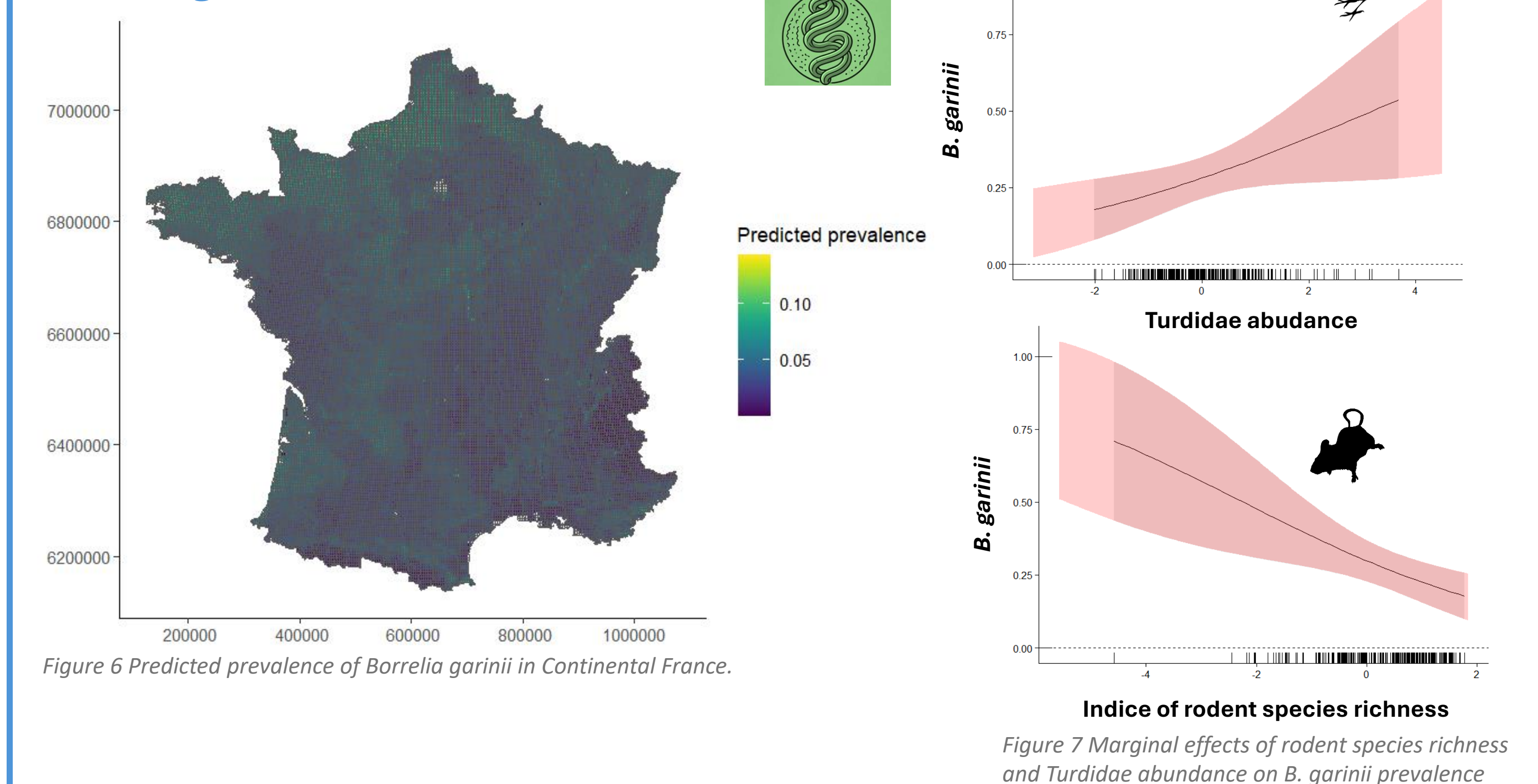


Figure 6 Predicted prevalence of *Borrelia garinii* in Continental France.

## Predicted Bbsl prevalence

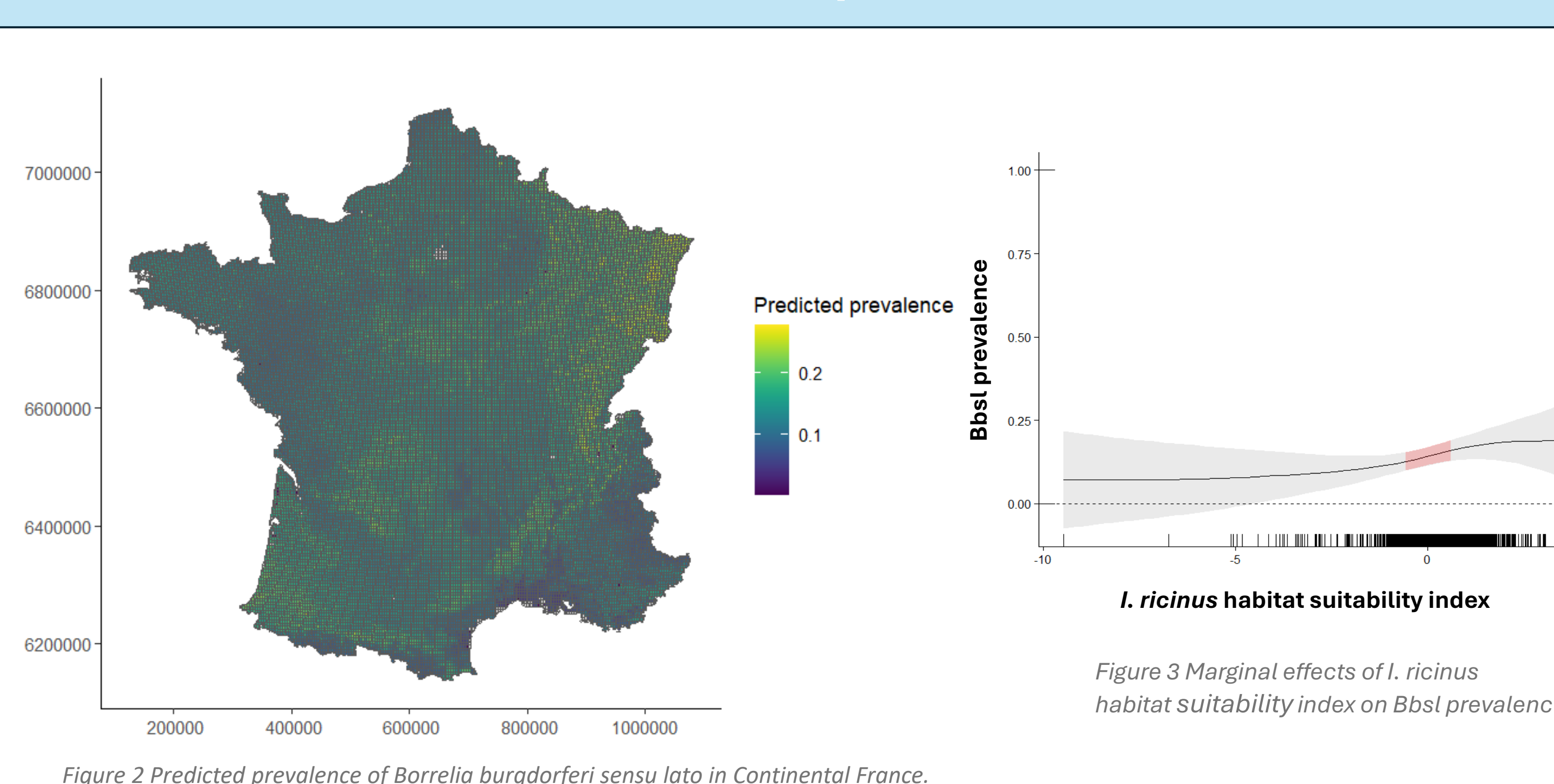


Figure 2 Predicted prevalence of *Borrelia burgdorferi sensu lato* in Continental France.

Figure 3 Marginal effects of *I. ricinus* habitat suitability index on Bbsl prevalence

No common factor between Bbsl genospecies except for tick presence

## Take home messages

- ✓ Heterogeneous spatial distribution between Bbsl genospecies
- ✓ Citique (citizen science) is an effective tool to capture broad trends
- ✓ Host differences are a key factor in explaining variations in distribution.

## Perspectives

- Reinforce sampling in low sampling areas to investigate local patterns
- Investigate bite reports to identify specific areas and time periods of human exposure.

