

# Behavioural patterns for the White-breasted thrasher *Ramphocinclus brachyurus* *brachyurus* : the socio-ecological conservation approach



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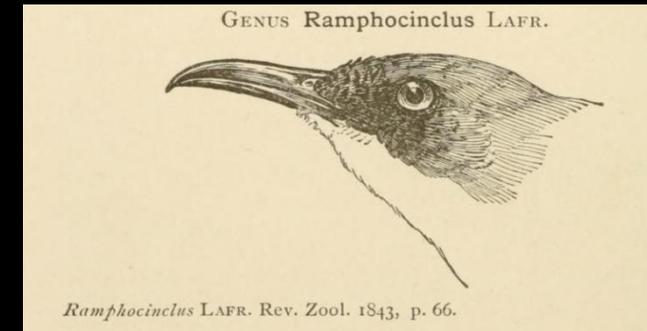
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# Research theme

- Collaborative approach to conservation biology: behavioural ecology of an endemic species, the White-breasted thrasher (*Ramphocinclus brachyurus*).
- Main objectives
  - Confront scientific knowledge with social representations.
  - Understand the interaction rules between social and ecological organizations.
- Co-supervisors : Dr. Daniel IMBERT and Dr. Jean-Raphaël GROS-DÉSORMEAUX
- Scientific co-supervisor : Pr. Frank CÉZILLY

# Presentation of the species

- The White-Breasted Thrasher *Ramphocinclus brachyurus*
- (Temple *et al.*, 2006, Mortensen *et al.*, 2014, 2016)
  - Mimids family (*Mimidae*)
  - Two islands and two subspecies



White-breasted thrasher  
(*Ramphocinclus brachyurus sanctaelucia*)

White-breasted thrasher  
(*Ramphocinclus brachyurus brachyurus*)



Photos by Jennifer Mortensen

# History of the species



Distribution of the White-Breasted Thrasher in Martinique - Map 2018 @Google

# Production of scientific knowledge

- Relative observation of habitat
  - Phytocenosis analyzes
  - Forest litter analyzes
- Observation on species
  - Capture-Mark Recapture sessions
  - Counting and marking nests
  - Behavioural analyzes
  - Listening points



# Social representations of conservation

- Naturalistic representations
  - How do ornithologists represent conservation issues ? 
- Legal representations
  - How did evolve formal and informal rules regulating interactions between the species and its environment? 
- Political representations
  - How did evolve conservation policies for the White-breasted thrasher ?
- **What discrepancies and concordances stand between scientific knowledges and social representations for the conservation of this species?**



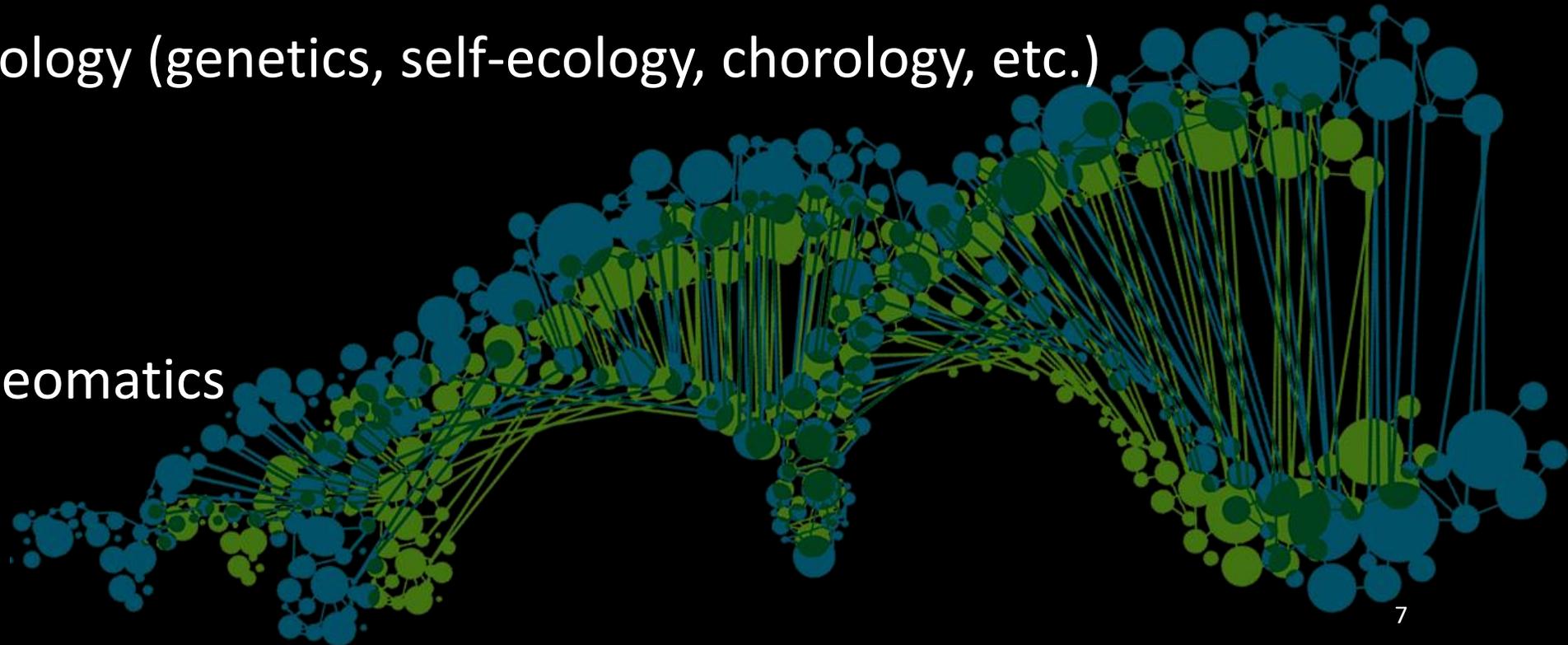
# Applied development research



- Collaboration agreement between le Parc Naturel Régional de la Martinique (PNRM), l'Université des Antilles (UA) and le Centre National de la Recherche Scientifique (CNRS).
- A **long-term** follow-up of the impacts of the changes on socio-ecological issues in the nature reserve of Caravelle peninsula in Martinique.

# Mobilized disciplines (concepts and methods)

- Behavioural Ecology
- Population biology (genetics, self-ecology, chorology, etc.)
- Sociology
- Geography/Geomatics
- Botanics



# Vigilance and disturbances

- Objective : Production of knowledges on the disturbances
- Theoretical framework:
  - Relationship between vigilance behaviour and capture effort (Beauchamp & Ruxton, 2016)
  - Many parameters may affect vigilance behaviour making predictions difficult (Deportes et al., 1989; Ferriere et al, 1996; Ferriere et al, 2001).
- Problematic :
  - Birds alternating between time spent in vigilance and time allocated for foraging (Beauchamp and Ruxton, 2016).
  - For some species, the size of the group can impact vigilance (Beauchamps, 2008; Cézilly & Keddar, 2012).
  - Burger & Gochfeld 2002 , vigilance increases near to trails.
- Research question: Can the vigilance behaviour of the White-breasted thrasher be predicted?
- Hypotheses :
  - Case A: There is no difference of vigilance according to the catching effort  $H_0$ , there are differences of vigilance according to the catching effort  $H_1$ .
  - Case B: There is no difference of vigilance according to the number of individuals present  $H_0$ , there are differences of vigilance according to the number of individuals present  $H_1$ .
  - Case C: There is no difference in vigilance according to the proximity of individuals to the trail  $H_0$ , there are differences in vigilance according to the proximity of individuals to the trail  $H_1$ .

# Methods

- Video recordings (total time spent prospecting: 260 hours)
  - Behavioural sequences alternating between:
    - Vigilance (V)
    - Scratching (S)
    - Eating (E)
- Quantification:
  - Vigilance rate (number of scans/time unit)
  - Capture effort (number of scratches/prey captured)



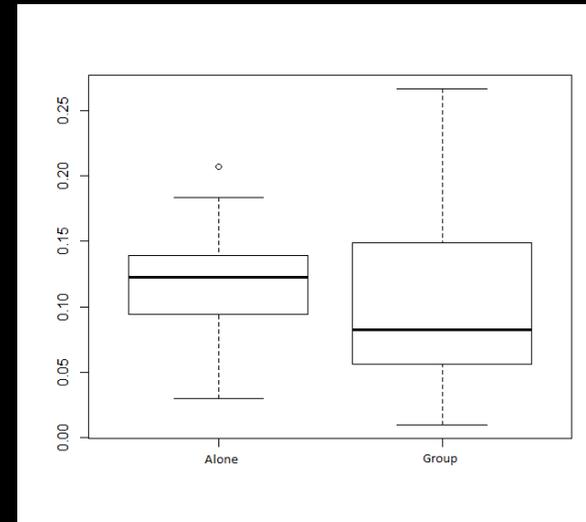
# Methods

- Correlation tests :
  - Pearson's test, to test the relationship between vigilance rate and capture effort.
- Comparison of means:
  - Two groups tested
    - Group 1 : <2 individuals
    - Group 2 : >2 individuals
  - T.test to determine the mean difference between the number of vigilance acts per seconds for the two groups.
  - Cohen's d computation for the mean difference between the number of vigilance acts per seconds for the two groups.
- Significance of the linear model:
  - Linear model built with the number of vigilance acts per seconds and distance to trail (meters).

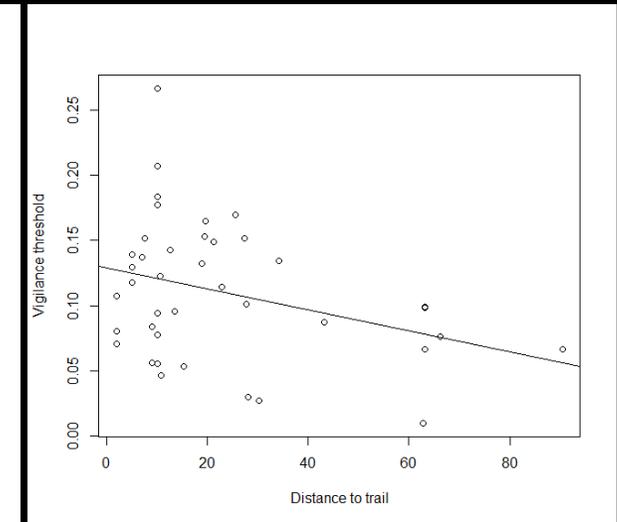
# Results

- Correlation tests :
  - Pearson's test : Not significant.
- Comparison of two means:
  - t-test not significant.
  - Cohen's d.
- Linear model:
  - Significant : negative relationship between vigilance rate and distance to trail.

Pearson's correlation	t	df	p.value	95% CI
Vigilance with Capture effort	-0.0967	38	0.9235	[-0.3256; 0.2973 ]



Average vigilance rate between two groups, n= 40 individuals .  $\bar{x}_1 = 0,117$ ;  $\bar{x}_2 = 0,104$ ; t= 0,787 ; df = 38; p.value=0,437; Cohen's d = 0,26; 95%CI = [-0,367;1,067]



Vigilance function of distance to trail, n= 40 individuals ; Estimate=0,0008; Std.Error=0,0004; t.value=-2,165; p.value=0,037

# Discussion

- Can the behavior of the White-breasted thrasher be predicted by capture effort, group size or distance to trail?
  - No relationship between vigilance rate and capture effort, or vigilance rate and group size, thus we cannot predict this with the studied sample.
    - Dependance of vigilance behavior to many parameters (Desportes *et al.*, 1989; Ferrière *et al.*, 1996; Ferrière *et al.*, 2001).
    - Possible situations : High vigilance and high capture effort; Low vigilance and low capture effort; high vigilance and low capture effort; low vigilance and high capture effort.
  - For the White-breasted thrasher, there is a negative relationship between vigilance rate and distance to trail : predictions can be made with the studied sample.

# Prospects

- While foraging, is there a threshold of number of individuals from which would appears the relationship between vigilance rate and group size?
- From which number of individuals, there is a relationship between capture effort and group size ?
- What is the distribution of the theoretical situations for vigilance and capture effort in the dataset?

# Prospects

- Definition:
  - « High vigilance rate »: when vigilance rate is upper the mean of the population
  - « Low vigilance rate»: when vigilance rate is under the mean of the population
  - « High capture effort »: when the capture effort is upper the mean of the population
  - « Low capture effort »: when the capture effort is upper the mean of the population



Vigilance rate	Capture effort	Frequency (%)
High	High	27,5
Low	Low	37,5
High	Low	20
Low	High	15

- 65% extreme situations
  - Are those behaviors exclusive?
- 20 % of the situations : individuals are very vigilant and performants for capturing preys.
- 15% of the situations : individuals are not vigilant and weak for capturing preys.
  - How do age, preys' abundance or predation risk can explain this ability?

# Methodological challenges

- Detection of small preys during recording analyzes
- Correlation tests between types of calls and vigilance.
- Correlation tests between types of calls and capture effort.
- Identification of individuals.
- Evaluation of the resource.



Thank you for your attention !

# Acknowledgement

- Beauchamp, G., et G. D. Ruxton. 2016. « Modeling scan and interscan durations in antipredator vigilance ». *Journal of Theoretical Biology* 390: 86-96. <https://doi.org/10.1016/j.jtbi.2015.11.015>.
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- Ferrière, Régis, Bernard Cazelles, Frank Cézilly, et Jean-Pierre Desportes. 2001. « Predictability, chaos and coordination in bird vigilant behavior ».
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