



Séminaire final HABIOS 28&29/10/2020



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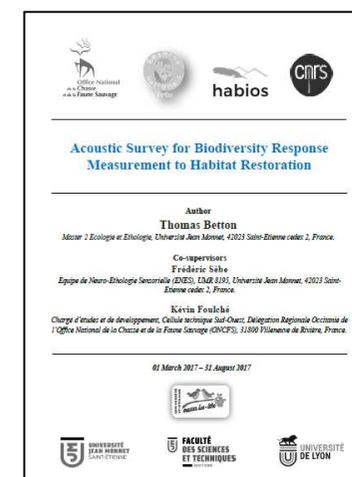
Projet financé par le FEDER · Fond Européen de Développement Régional
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Suivi acoustique de la réponse de la biodiversité aux travaux de restauration de l'habitat du Grand tétras



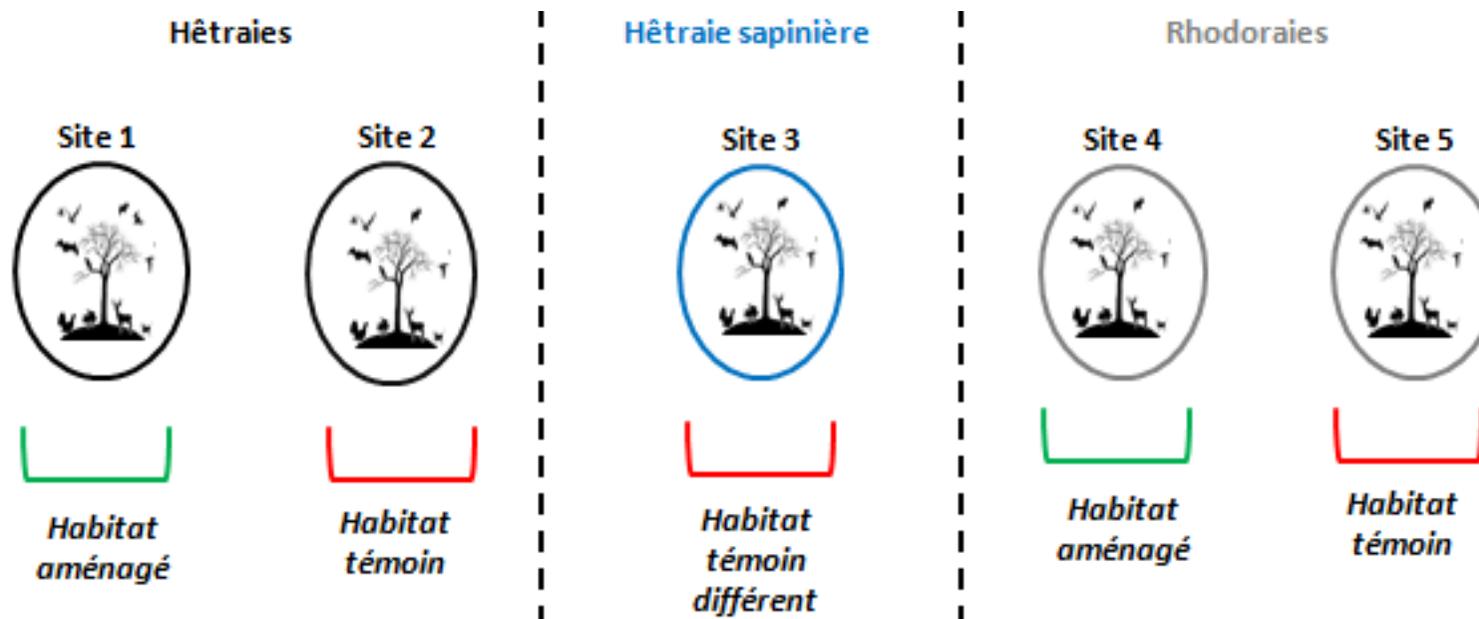
✓ Historique 2016/2017 de l'action Bioacoustique Orlu :

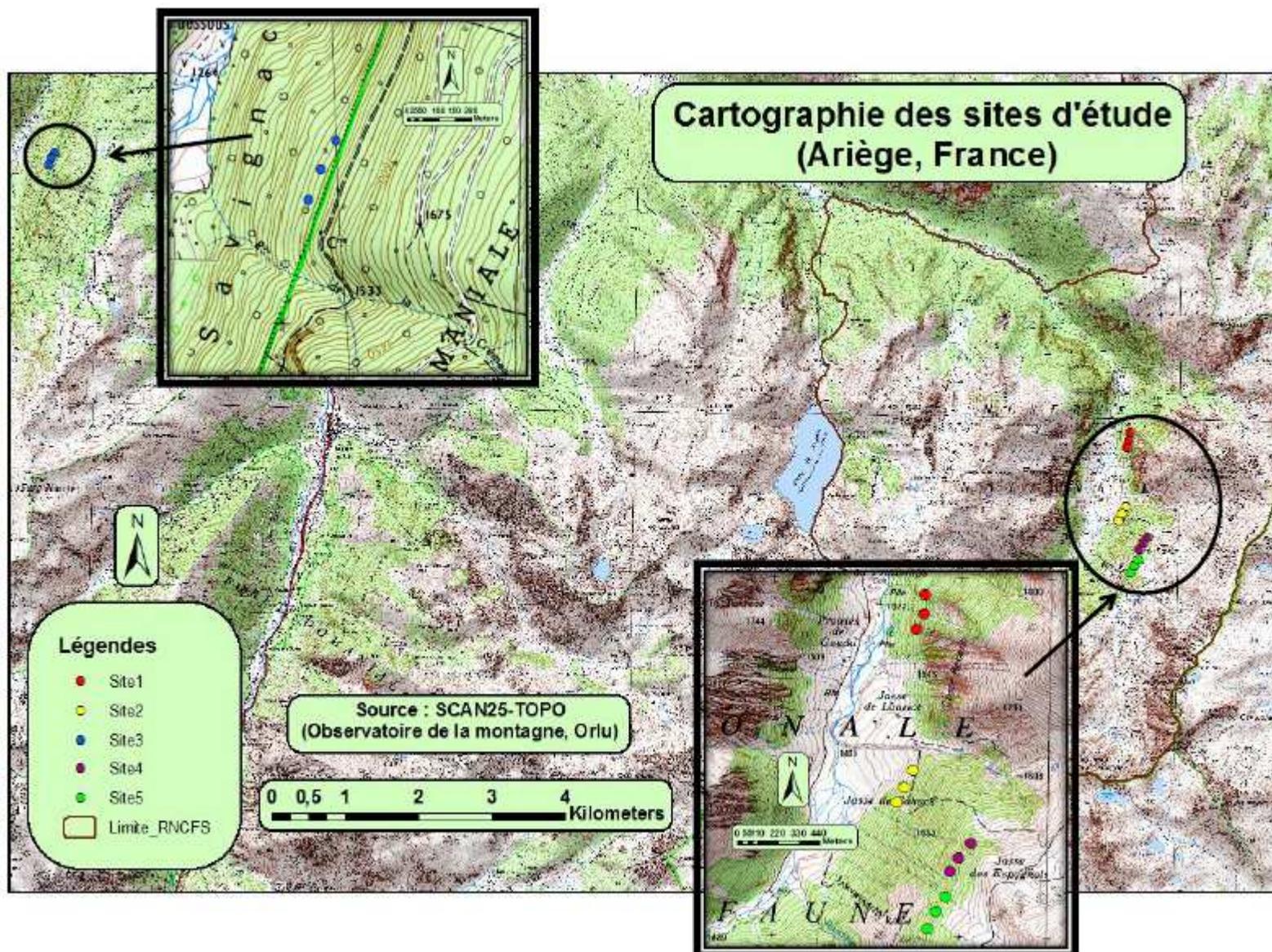
- Un partenariat existant avec le bioacousticien Frédéric Sèbe
- Réunion bioacoustique Habios Action 3.3 (21/03/2017, Orlu)
- Stage ONCFS Master 2 « Utilisation des signaux acoustiques globaux pour l'évaluation des bénéfices escomptés pour la biodiversité forestière suite à des travaux de génie écologique réalisés en faveur du Grand tétras au sein de la RNCFS d'Orlu »
- Collaboration ONF pour la mise à disposition d'un site d'étude en forêt domaniale



✓ Protocole opération bioacoustique Orлу 2017

- Un dispositif impliquant l'utilisation de 12 balises acoustiques SM4 (Wildlife acoustics) pendant environ 3 mois,
- 4h enregistrement/jour (2h matin → communauté des oiseaux + 2h midi → communauté des insectes),
- Calculs et comparaison de 8 indices acoustiques de biodiversité, dont l'entropie bioacoustique « H » :





✓ Résultats opération bioacoustique Orlu 2017

- Une prise en compte du bruit de fond « anthropique et naturel non biologique » afin de l'écartier des analyses (approche originale)



✓ Résultats opération bioacoustique Orlu 2017

- Une entropie bioacoustique « H » calculée :
Hêtraie sapinière témoin > Hêtraie aménagée > Hêtraie pure témoin
Rhodoraie aménagée > Rhodoraie fermée témoin



**Habitat
témoin**



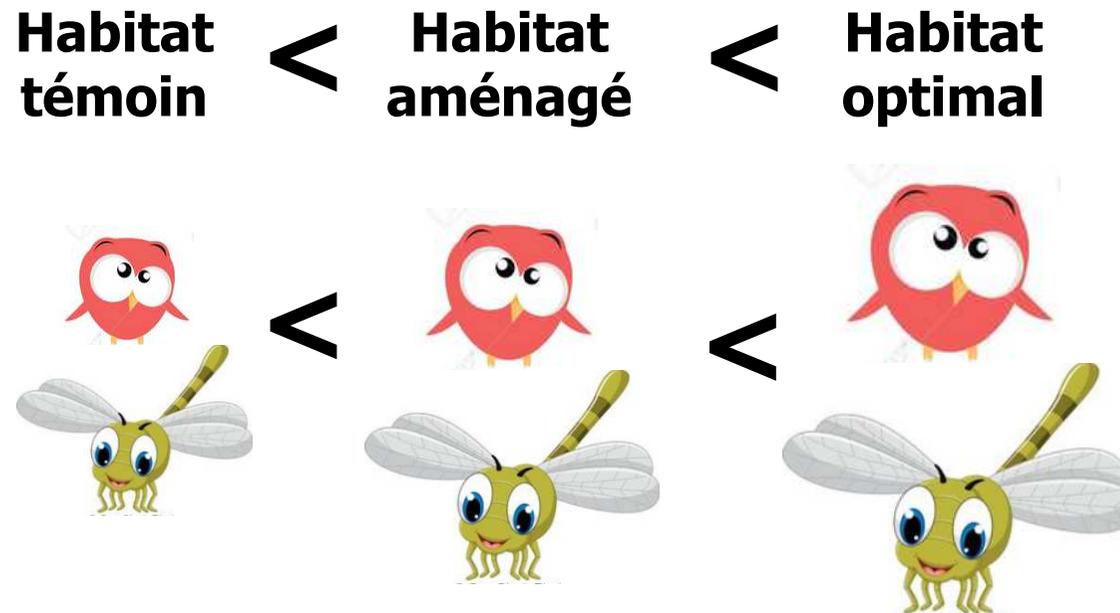
**Habitat
aménagé**



**Habitat
optimal**

✓ Résultats opération bioacoustique Orlu 2017

- Une entropie bioacoustique « H » supérieure dans les zones aménagées/optimales VS les zones non aménagées :
 - pour les enregistrements matinaux (avifaune)
 - pour les enregistrements du midi (insectes)





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Article scientifique à paraître dans Biological Conservation

Acoustic monitoring of biodiversity response to habitat restoration
Thomas Betton (1-4), Kévin Foulché (1), Emmanuel Ménoni (1), Claude Nova (2), Florence Nicolé (3), Nicolas Mathevon (4), Frédéric Sèbe (4)

Introduction | Regarding gross habitat degradation, quick biodiversity assessment is one of the major challenges in modern ecology. The restoration of natural habitats is known to improve biodiversity level but its measurement is often incompatible between studies. This study aims to measure biodiversity response to habitat restoration realized to favor the Western capercaillie and its associated biodiversity, with an automated and repeatable acoustic survey based on soundscapes recording in the french Pyrenees.

Main questions | Does the habitat restoration realized for the Western capercaillie favor the overall biodiversity level in the habitat? And can we monitor it with automated acoustic survey?

Materials and methods | Two acoustic indices, used as proxies of biodiversity levels and community differences, were computed in three habitats (forests) and restoration contexts: two types strongly influenced by past human activities: beech forests (control/restored), mountain pine forests with dense rhododendron understory (control/restored) and one mature mixed fir and beech forest not impacted by any management since a long time.

1) Study sites and restoration context

2) Acoustic recordings

Song Meter 4 Wildlife Acoustics (Acoustic, 2005)

3) Acoustic indices of biodiversity

DE = Difference of acoustic entropy between animal signals and noise → Biodiversity level
 D = Acoustic dissimilarity between recordings → Community differences

Results

3.1) Species richness

Only natural noise

Control

Restored

3.2) Biodiversity level

Animal acoustic diversity

Biodiversity

Higher biodiversity level in restored sites than in controls

3.3) Community differences

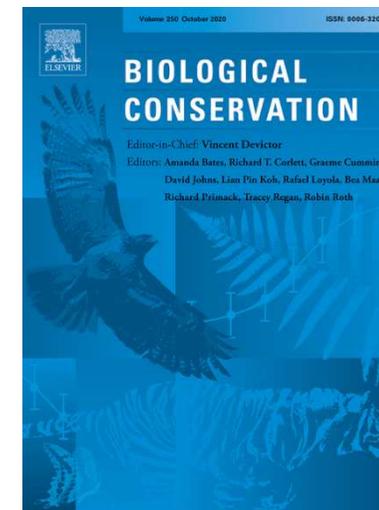
Acoustic dissimilarity between recordings

Spatial heterogeneity of biodiversity

Higher spatial heterogeneity of biodiversity in the restored mountain pine forest than in the control

Discussion and conclusion

- Efforts made towards the Western capercaillie are able to enhance the biodiversity of its habitats.
- The response processes of biodiversity are well established in mountain pine forests but not yet in beech forests. The mixed forest is the most diversified habitat.
- Mountain pine forests: the restoration generated a higher heterogeneity of biodiversity with new micro-habitats and probably induced a better circulation of the ground-living fauna as the Western capercaillie or ungulates and their associated biodiversity (insects, etc.) (Pekala et al., 2003).
- Beech forests: there is a just trend to heterogeneity of biodiversity due to the restoration and as few new micro-habitats. The restoration probably created dead wood biomass resources (Muller and Butler, 2010), an under canopy favorable for insects (Bos et al., 2007) and their associated bird communities.
- Automated acoustic surveys well measured the pattern of the biodiversity response to restorations in two habitats. Acoustic surveys are reliable tools for monitoring biodiversity response to habitat restoration.



Acoustic monitoring of biodiversity response to habitat restoration

Betton Thomas, Foulché Kévin, Ménoni Emmanuel, Nova Claude, Nicole Florence, Van Niekerk Mark H., Mathevon Nicolas, Sèbe Frédéric

