

# Density of woodpeckers in a fragmented lowland landscape of Northern Italy

Zeno Porro, Arianna Musacchio, Gianpasquale Chiatante, Alberto Meriggi

Department of Earth and Environmental Sciences, Università degli Studi di Pavia, via Ferrata1-27100 Pavia, Italy  
e-mail: z3no@hotmail.it

## INTRODUCTION

Habitat fragmentation is a major threat to biodiversity. Understanding how to enhance connectivity in highly fragmented landscape is crucial for wild fauna conservation. The lowland portion of Province of Pavia - around 2200 km<sup>2</sup> - is dominated by agricultural landscape with the presence of scattered wooded patches (11,6%). Here we investigate the habitat value of unmanaged broad-leaved forest stands, agro-forestry plantations (mainly poplar plantations) and tree rows for two woodpecker species: Great Spotted Woodpecker (*Dendrocopos major*) and Green Woodpecker (*Picus viridis*), known to be possible indicator for habitat fragmentation.

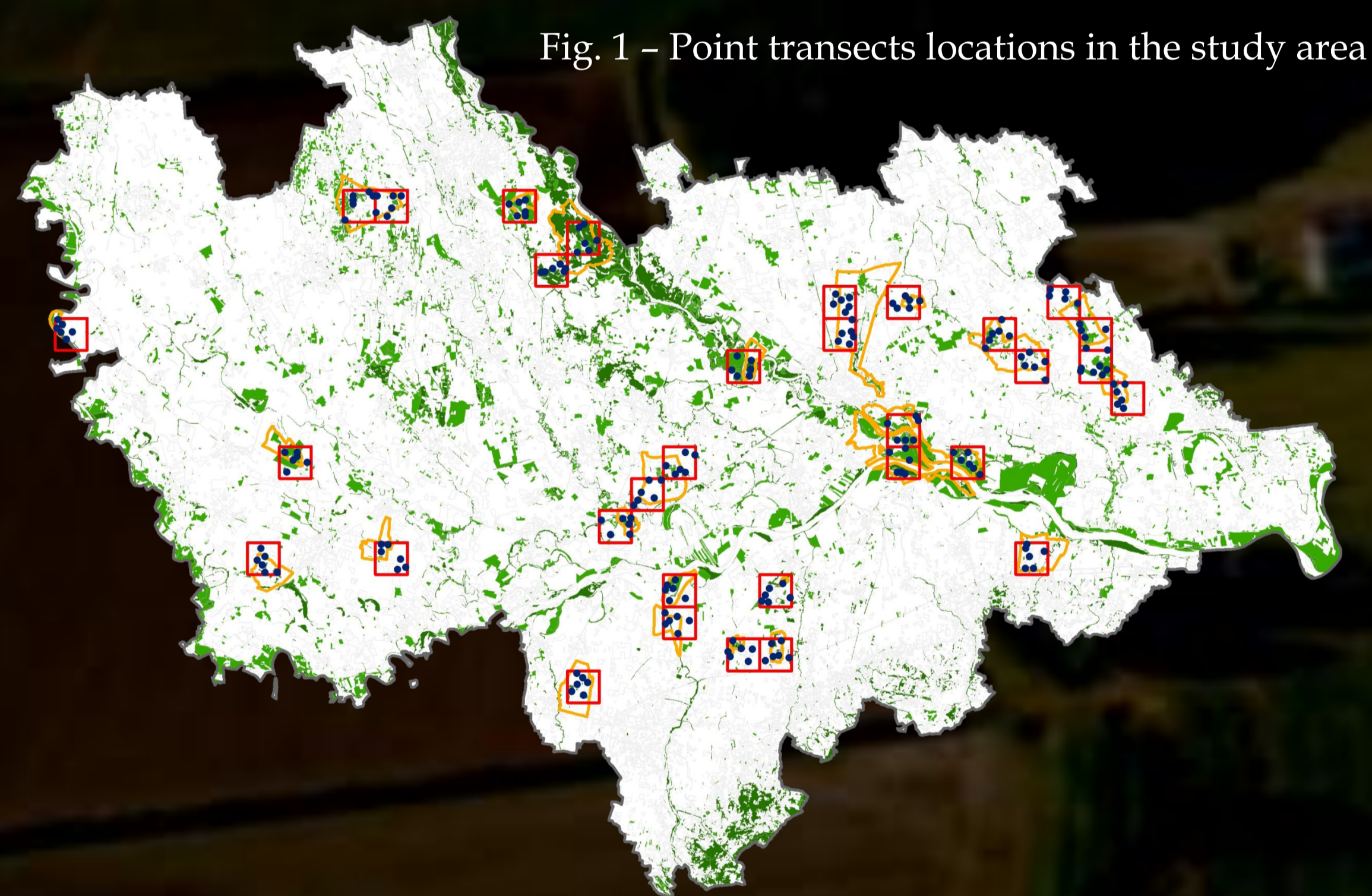


Fig. 1 - Point transects locations in the study area



Fig. 2 - Detection function for *D. major* in the total area

## MATERIAL & METHODS

Data were collected through 191 point transects carried out in 23 protected areas, spread all over the study area (Fig.1), during Spring 2014. Playback stimulation was used. Points locations were classified in two different ways:

1. according to land use (unmanaged forests cluster, agro-forestry plantations cluster and agricultural matrix cluster);
2. according to the extent of tree rows (high, medium and low extent of tree rows cluster).

Woodpeckers densities in the total area and in the six clusters were calculated using distance sampling. This method allows accurate estimates of density utilizing a detection function, as a large proportion of birds may go undetected, especially with increasing distance from the point.

Cluster	Samples	Unmanaged forest (%)	Agro-forestry (%)	Tree rows (m/km <sup>2</sup> )	<i>D. Major</i> (N)	<i>P. viridis</i> (N)
Unmanaged forest	21	40.33	9.46	913.62	30	18
Agro-forestry	37	4.30	53.59	1294.81	32	29
Agricultural matrix	133	3.22	5.77	1546.86	42	40
High tree rows extent	43	3.79	11.28	2660.94	25	20
Medium tree rows extent	70	5.68	16.42	1630.06	36	44
Low tree rows extent	78	11.20	16.85	568.00	43	44
Total	191	7.51	15.44	1428.42	107	108

Tab. 1 -Environment characterization and birds detected in the six clusters and in the total sampled area

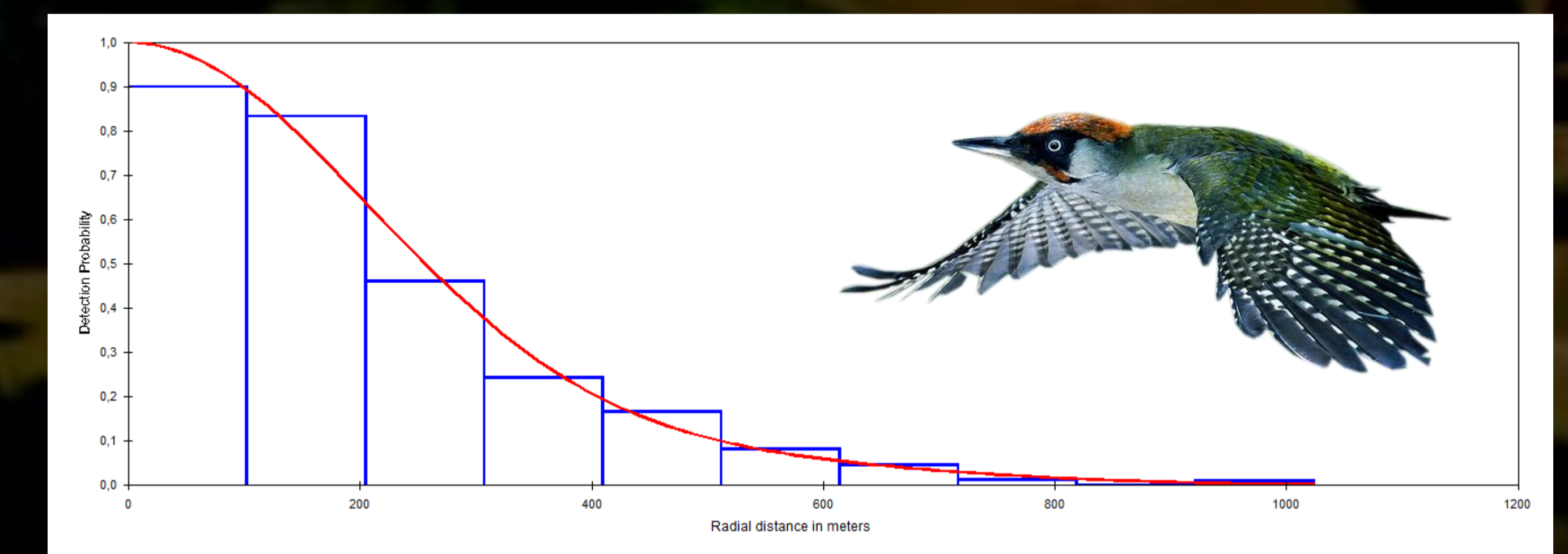


Fig. 3 - Detection function for *P. viridis* the total area

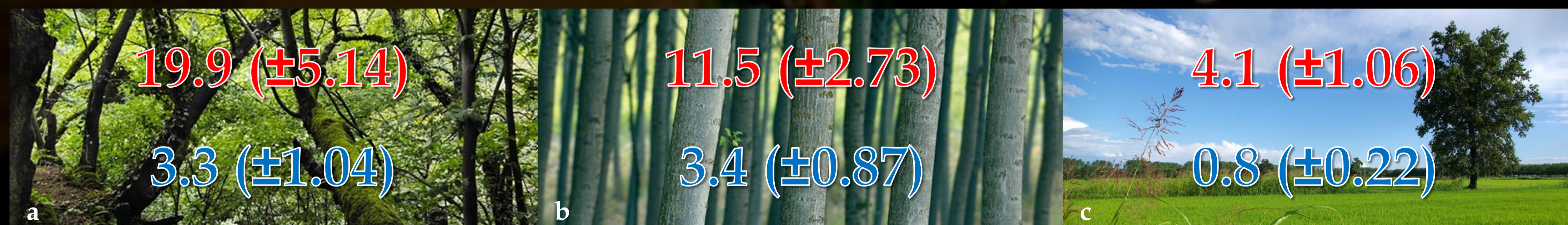


Fig. 4 - Density (±ES) of *D. major* and *P. viridis* (birds/km<sup>2</sup>) in unmanaged forest (a), agro-forestry (b) and agricultural matrix (c).



Fig. 5 - Density (±ES) of *D. major* and *P. viridis* (birds/km<sup>2</sup>) in high (a), medium (b) and low (c) extent of rows clusters.

## RESULTS & DISCUSSION

✓ Great Spotted Woodpecker density estimated in the total area was 6.8 (±0.92) birds/km<sup>2</sup> (detection function: half-normal with cosine adjustments of 2 orders; AICc = 1280.63; KS test: p = 0.77; Fig. 2).

✓ Green Woodpecker density in the total area was 1.6 (±0.26) birds/km<sup>2</sup> (detection function: half-normal with cosine adjustments of 2 orders; AICc = 1431.72; KS test: p = 0.99; Fig. 3).

✓ Both species showed high densities in any wooded habitat, resulting in a positive habitat value of agro-forestry plantations, although Great Spotted density peaked in unmanaged forest stands (Fig. 4).

✓ A positive role played by tree rows was evident for Great Spotted only, as areas with high extent of rows presented higher densities of this species (Fig. 5).